LIBRARY OF THE
COLLEGE OF PHYSICIANS
OF PHILADELPHIA

Digitized by the Internet Archive
in 2013

http://archive.org/details/transactionsstud4171coll

TRANSACTIONS
& STUDIES
of the
College of Physicians
of
Philadelphia

FOURTH SERIES

VOLUME 17

1949-50

WAVERLY PRESS, INC.
Baltimore, Md.

The College of Physicians of Philadelphia does not assume responsibility for statements or views expressed by contributors to the *Transactions & Studies*. The editor checks bibliographic references, to aid in making them factually reliable, and occasionally supplies headings in the text, to facilitate reference to clearly defined portions of the text; the communications are in other respects printed exactly as they were submitted, subject to author corrections on the galleys.

An index to the annual volume of the *Transactions & Studies* appears in the fourth and final number (February) of the volume.

The scientific and historical communications are indexed in: *Biological Abstracts; Current List of Medical Literature; Index-catalog of the Library of the Surgeon General's Office, U. S. Army; Quarterly Cumulative Index Medicus.*

The Transactions & Studies of the College of Physicians of Philadelphia is published four times a year—April, June, December, February—at Baltimore, Maryland by the College of Physicians of Philadelphia. Subscription, $2 a volume. Single copies, 75 cents.
Publication Office: Mt. Royal and Guilford Aves., Baltimore 2, Md. *Editorial correspondence* should be addressed to: The Editor, College of Physicians of Philadelphia, 19 South 22d Street, Philadelphia-3, Pa. Entered as second class matter June 21, 1938, at the Post Office at Baltimore, Md., under the act of August 24, 1912.
Printed in U. S. A.

Contents

NO. 1, APRIL, 1949

Public Health in the Changing Order (*James M. Anders Lecture XXIII*) ..... *Ernest L. Stebbins* 1
Psychiatry in Medicine and Society (*S. Weir Mitchell Oration XI*) ..... *Thomas A. C. Rennie* 9
Memoir of Solomon Solis-Cohen ..... *Augustus A. Eshner* 21
Catalogue of the Mütter Museum of the College of Physicians of Philadelphia. Parts III–XI *Ella N. Wade* 23
Officers, Committees, Sections, and Administrative Staff of the College, 1949 46

NO. 2, JUNE, 1949

Cancer of the Lung (*Thomas Dent Mütter Lecture LXI*) ..... *John H. Gibbon, Jr.* 49
Medical Education: the Past Century and the Future ..... *Victor Johnson* 61
Transactions of the Sections: Programs, and Abstracts from the Section on General Medicine 69
Catalogue of the Mütter Museum of the College of Physicians of Philadelphia. Part XII (*conclusion*) *Ella N. Wade* 75
Pathological Society of Philadelphia: Proceedings of the Meetings, including Abstracts, November, 1948–May, 1949 98

NO. 3, DECEMBER, 1949

Comparison of Oral Penicillins ..... *William P. Boger, John O. Beatty, and Harrison F. Flippin* 105
Steps toward World Health and Security ..... *John H. Arnett* 115
Memoir of Joseph Sprague Evans ..... *William S. Middleton* 119
The Role of Disease in the 70,000 Casualties in the American Revolutionary Army .. *James E. Gibson* 121

NO. 4, FEBRUARY, 1950

The Role of Medical Group Practice in the Changing Order (*James M. Anders Lecture XXIV*) *George Baehr* 129
Transactions of the Sections: Programs, and Abstracts from the Section on General Medicine 139
List of College Lectures, 1949 146

Annual Reports

President's Address *T. Grier Miller* 147
Treasurer, 152; *Library*, 154; *Mütter Museum and College Collections*, 161; *Publication*, 163; *Sections*, 165
List of the Fellows 166
Index to Volume 17 183

TRANSACTIONS & STUDIES

of the

College of Physicians of Philadelphia

Volume 17
(Fourth Series)

Number 1
(April 1949)

Public Health in the Changing Order*

By ERNEST L. STEBBINS, M.D., M.P.H.

Professor of Public Health Administration and Director, The Johns Hopkins University School of Hygiene and Public Health

I MUST plead guilty to at least petit larceny in the selection of the subject for my address this evening. It is obviously an adaptation of the studies made by the committee of the New York Academy of Medicine on *Medicine and the Changing Order* on which I had the honor to serve. Throughout the committee's deliberations and studies, it was clearly recognized that the problems of medicine in general were inseparably related to the problems traditionally associated with the activities of government in medicine as represented by the Public Health Services.

THE PUBLIC HEALTH

It has been difficult to define public health both etymologically and practically. The word "public" and the word "health" is each a relative term. Public health activities in the past were usually limited to services of a primarily preventive character. But, by general practice, this sharp division of preventive and curative services has gradually been abandoned, at least in certain fields. This has been particularly true in the care of the tuberculous and those suffering from venereal diseases. Perhaps the most accurate and practical definition of "public health" would be that it is those services in the medical or health fields for which government takes a major responsibility. In order to define our subject then, we must ask, "What is the legitimate participation of government in the medical and health fields?" Abraham Lincoln defined the function of government as follows: "The legitimate object of government is to do for a community of people whatever they need to have done but cannot do at all or cannot do as well for themselves in their separate and individual capacities." Winslow, following this same principle, defined public health as "The prevention of disease, the prolongation of life and the promotion of physical and mental efficiency by organized social activity." This broader definition obviously embraces the activities of a voluntary health agency as well as that of the governmental agencies.

The development of the public health program in the United States has been shaped by legal provisions of acts of Congress, by state legislation, city ordinances, and regulations of local boards of health. The extent of these legal provisions for the protection of the public health has been influenced by the development of scientific knowledge of

* James M. Anders Lecture XXIII, The College of Physicians of Philadelphia, delivered 1 December 1948.

the prevention and the control of disease, the applicability of such scientific knowledge through a governmental organization, and the attitude or interest of the medical profession and the public concerning the need or the desirability for organized community action. The development of health services throughout the forty-eight states was not uniform. But there has been, particularly in the last seventy-five years, an extensive development of health services at the local, state, and national level. Understandably, the early developments in public health were directed toward the most obvious and most pressing problems in the prevention of disease. These problems were primarily environmental hazards and epidemic disease. Purification of water supplies, safeguarding milk, the control of small-pox, yellow fever, cholera, typhoid fever, and the epidemic diseases of childhood consumed nearly all of the available resources of the early health departments. The record of accomplishment in the elimination of these health hazards is well known to all of you. With the elimination of these hazards and with the tremendous advance in our knowledge of medicine and public health, health departments turned to other activities for the prevention of disease and disability and many extensive programs were developed in the medical or clinical fields. These activities included programs of tuberculosis control, venereal disease control, and maternal and child hygiene. Again the efforts of the health department apparently met with great success. The striking reduction in infant mortality, the reduction in mortality from tuberculosis, the practical elimination of diphtheria and small-pox, all attest to the vigor of this approach and seem to form a justification for the entry of government into the field of medical service. It is well to remember, however, that in many parts of the country there was considerable opposition to the government entrance into such activities as the operation of clinics for tuberculosis, venereal disease, and well-babies. It is interesting that while these developments encroached on the field of the private practitioner, with few exceptions, mutually satisfactory working relationships have been established and the development of these new programs has the full support of the medical profession.

THE CHANGING ORDER

Under the influence of what we have chosen to call "the changing order" there has been increasing pressure to expand the activities of the official health department. Let us consider for a moment what we mean by "the changing order." There can be little doubt that there have been tremendous changes in the national life of this country during the past four decades. In this period we have seen the major effects of industrial development and have recognized specific industrial health hazards. Of particular importance was the increasing tendency toward urbanization which brought with it many advantages as well as disadvantages to the health of the public. The rapid unplanned development of the cities resulted in localized increased morbidity and mortality and indirectly stimulated the early developments in the field of public health. The industrial development of the country, on the other hand, greatly improved the standard of living for a considerable proportion of the people and this improvement produced definite benefits to the public health.

Through the early decades of the twentieth century the application of knowledge of preventive medicine and public health markedly reduced the general death rate. But the greatest saving of life was in the younger age groups with the resultant increased proportion of the population in the older age groups. This aging of the population is, in a large measure, responsible for the changing emphasis in health department activities. As life expectancy increased, largely through reduction in the hazards of infancy and childhood, the problems of adult hygiene were accentuated. Increasing proportions of the population were

to be found in the age groups of high prevalence of such chronic disabling conditions as heart disease, diabetes, cancer, and mental illness. Recognition of these as of major and proportionately increasing significance to the health of the nation is indicated by the creation, in many health departments, of special provisions for the care of the chronically ill and for the prevention of specific disease entities. The federal government has created and generously supported three new national institutes for research and for the development of control measures in mental hygiene, cancer, and heart disease.

Concurrent with the changing character of the population of the United States, there has been a changing character of government. The evidence of a progressive strengthening of the national organization and an increase in federal influence in all governmental activities must be obvious to everyone. This has been particularly apparent in the field of public health during the past three decades. This change toward greater federal interest in public health activity seems to date from about the time of world war 1. The delegation of increased authority to the federal government, associated with participation in a world war, together with the confidence in preventive medicine created by the experiences of the war, led to federal support of preventive medicine in the Army, the Navy, and the Public Health Service. The effects of the great economic depression of the early thirties were responsible for the further strengthening of the federal government and for the expansion of its field of interest in public health. The tremendous increase in federal support of public health activities contained in the Social Security Acts of 1935 marked the beginning of an era of great expansion in public health services through federal aid to the states. Congress has appropriated increasingly larger sums for grants-in-aid to the states through the agency of the United States Public Health Service and the Children's Bureau. Appropriations have been made for grants for the general development and strengthening of state and local health services but, by far, the largest sums have been appropriated for grants to the states for specific purposes. Notable among these have been the appropriations for venereal disease control, maternal and child hygiene, aid to the crippled child, and tuberculosis control. During the past three years, comparatively large sums have been appropriated for surveys of hospital and health center needs and for the construction and expansion of public health facilities in the fields of mental hygiene, cancer, and heart disease. The availability of federal assistance will almost certainly accelerate the development of specific activities in these specialized fields. The federal grants, for the most part, must be matched or are contingent upon varying degrees of state and local participation. This is not an entirely new concept as many states have long aided local health development through a program of state aid. Fears have been expressed that the governmental agency making grants-in-aid would attempt to dominate or control the receiving agency, he who holds the purse strings, etc. My own personal experience as health officer for New York City during a period in which that local community received much in state and federal aid would tend to allay such fears. Moreover, nothing short of a radical revision of the taxing powers of the various political subdivisions would be able to reverse or even check the trend toward greater federal participation in health activities.

LOCAL HEALTH SERVICE

One of the most urgent unmet needs in public health in the United States is the provision for at least minimum fulltime local health services for the approximately one-third of the population not now served. There is apparently complete unanimity of opinion as to the necessity for extending local health services to the rest of the nation. In June of 1942 the House of Delegates of the American Medical Association endorsed the establishment of fulltime local health units to serve

every area and unit of the population of the United States in the following terms:

"Whereas a major inadequacy in the civilian health protection in war as in peacetime exists consequent upon the failure of many states and of not less than half the counties in the states to provide even minimum necessary sanitary and other preventive services for health by fulltime professionally trained medical and auxiliary personnel on a merit system basis supported by adequate tax funds from local and state and, where necessary, from federal sources. Therefore, be it resolved that the trustees of the American Medical Association be urged to use all appropriate resources and influences of the Association to the end, that at the earliest possible date, complete coverage of the nation's area and population by local, county, district, or regional fulltime modern health services be achieved."

An almost identical resolution was adopted by the governing council of the American Public Health Association in the same year. A similar resolution was adopted by the Conference of State and Provincial Health Authorities of North America in 1944. The same principle was endorsed by the National Health Assembly in 1948. Legislation was introduced in the last session of the congress which, if passed, would have provided federal funds to defray approximately one-third of the cost of the extension of local health services to the remainder of the nation. Similar legislation is almost certain to be introduced in the next session of the congress with, at least, better than an even chance of being passed.

The appropriation of funds, whether federal, state, or local, will not in itself make possible the extension of health services to that part of the nation not now served. It is well known that of existing positions for which funds have been appropriated, as high as fifty per cent cannot be filled with properly trained health officers in some states. In spite of active recruitment programs in several states, it has been impossible to attract competent young medical men into the service. Adequate personnel cannot be obtained until the rewards in positions of responsibility in public health are made comparable to those in private practice. Comparative studies of income in some of the states having the greatest difficulty in obtaining local health officers have shown that salaries offered for these positions are not more than fifty to seventy-five per cent of the average net income of the general practitioners of the area. Doctors are not noted for their business acumen but it would take a super salesman to convince one that he should spend two or three years in graduate study in order that he might seriously reduce his income.

Not only is recruitment difficult but loss of public health personnel to private practice is increasing rapidly in many parts of the country. There are, of course, notable exceptions to the rule, particularly in New York, New Jersey, California, and Florida where an effort has been made to keep pace with rising costs of living. This is reflected in recruiting results.

Another, and perhaps equally important force that has prevented qualified young men from entering the field of public health as a specialty, has been the lack of formal recognition of the specialty of public health, as evidenced by certification by a board. The importance of preventive medicine and public health to the armed forces during the recent war emphasized the need for formal recognition of competence in the field of preventive medicine. The Surgeons General of the Army, the Navy, the Public Health Service and the Chief Medical Officer of the Air Force have recently established a board to review the qualifications of medical personnel assigned to preventive medicine in order that competence in this specialty might be recognized.

At its meeting in June of 1947, the Section on Preventive and Industrial Medicine and Public Health of the American Medical Association appointed a committee to in-

vestigate the need and the justification for a Specialty Board in Preventive Medicine and Public Health. In the same year, the Health Officers Section of the American Public Health Association appointed a committee to review the same subject. Both of these committees came to the conclusion that there was need for a specialty board in preventive medicine and public health and concurred in the following statements:

1. Public health and preventive medicine has now attained the status of a distinct specialty of medicine.

2. Facilities have been developed for adequate graduate training in this specialty of medicine through the development of academic courses in public health and preventive medicine in the schools of public health accredited by the Committee on Professional Education of the American Public Health Association, and through supervised practical training in training centers operated by departments of health.

3. The establishment of a specialty board for positions in preventive medicine and public health will still further stimulate more adequate preparation of health officers for their responsibilities.

4. There are at least 500 physicians in preventive medicine and public health now practicing that specialty, having had training in the specialty of public health comparable to the training required for certification by other specialty boards in medicine.

Both Committees recommended that an organizing committee for such a specialty board be created, having the following members: Three members named by the American Medical Association, three by the American Public Health Association, and one each by the Canadian Public Health Association, the Southern Medical Association, and the Association of Schools of Public Health. This proposal was approved by the appropriate section of the American Medical Association and by the executive boards of the other sponsoring societies. The organizing committee has taken certain steps in the formation of a Specialty Board in Preventive Medicine and Public Health. Qualifications for eligibility for examination have been drawn up and are, in brief, as follows: Graduation from a medical school approved by the Council on Medical Education and Hospitals of the American Medical Association; not less than one year of interneship in a hospital approved by the same Council; licensure to practice medicine in the United States or in Canada; membership in the American Medical Association and the American Public Health Association; adequate special training in preventive medicine and public health which shall include:

1. Successful completion of at least one academic year of graduate study leading to the degree of Master of Public Health or an equivalent degree in a college or university accredited for the purpose of such graduate study by the American Public Health Association.

2. At least one year of field experience as a resident in preventive medicine or public health practice which includes planned instruction, observation, and active participation in a comprehensive organized public health program, approved by the Professional Education Committee of the American Public Health Association as competent to provide proper training and experience in public health or preventive medicine practice.

3. A period of not less than three years, in addition to the above, of special training in or teaching or practice of preventive medicine or public health.

Eligible applicants will be required to appear for a comprehensive written and oral examination. Proposed criteria for accreditation of residency training in public health or preventive medicine and minimum standards for field training areas have been established. Application has been made to the Advisory Board on Medical Specialties of the American Medical Association and approval by this body would, in all probability, provide an impetus to the recruitment program of health departments and, moreover, would

be a stimulus to the development of improved training facilities. It should be pointed out that expansion of public health facilities to provide fulltime local health departments throughout the nation would place an impossible burden upon the training facilities now in existence. At the present time, there are nine accredited schools of public health in the United States. All of these are operating at or close to their maximum capacity. Yet these schools graduated in 1947 only 200 medical health officers and of these not more than 150 were presumably available for civilian health services in the United States. This number was insufficient to meet the existing demand due to death, retirement, or loss to private practice.

The establishment of the new school of public health at the University of Pittsburgh is most timely if there is to be the proposed early extension of fulltime local health services throughout the nation. Further expansion of the existing schools would be difficult if not impossible. As in medical education, high operating costs in the schools of public health result in a cost per student many times the tuition paid. Four of the nine schools are in state universities and these states might quite understandably question the propriety of their bearing the heavy burden of training public health officers for other states. I believe it is no secret that the endowed schools have not been harassed with offers to increase their endowments sufficiently to permit great expansion. Federal subsidies for schools of public health, as well as for medical schools, may be considered necessary to meet apparent needs. I can assure you that having guarded academic freedom as zealously as our universities have, the hazards of subsidization will be carefully weighed.

There is, perhaps, an even more serious shortage of field training facilities for the residency in public health. Shortages of trained personnel in existing health departments accentuate the difficulties in providing adequate training for new personnel. Efforts are being made to improve existing field training or residency opportunities in many states. The accreditation program of the American Public Health Association in connection with the Specialty Board undoubtedly will be an important stimulus to greater efforts for improvement.

We have dwelt at some length on the medical manpower shortage that must be faced in the proposed expansion of public health facilities. Even more serious shortages exist in the ancillary services which such expansion would require. The most serious problem exists in public health nursing. The recent national survey shows some 14,000 public health nurses engaged in local health work. The number needed to provide a minimum basic service is estimated at over 27,000 and complete comprehensive nursing service would require some 60–70,000. No one but a starry-eyed optimist would accept the possibility of meeting these needs except in the remote future. The most optimistic predictions for recruitment of all types of nursing could not meet these estimated needs and competition for new graduates is keen. Nothing short of a complete reorganization of nursing education and nurse recruitment and the offering of much greater inducements to young women who might enter the nursing profession can possibly solve this problem.

A FEDERAL DEPARTMENT OF HEALTH

The increasing participation by the federal government in health and medical activities has given impetus to the movement to create a department with cabinet status for health and medical matters. Ministries of health have long existed in many national governments. The American Medical Association has been on record as favoring a federal department of health and other national health organizations have, from time to time, expressed interest in a reorganization of federal departments to bring under one general supervision the many and widely separated health and medical activities of the federal government. In 1939 the first plan of reorganization was put into effect thus creating the Federal Security Agency. This reorganization brought

only part of the federal health activities under the newly created agency but included in the same agency activities in the field of education and welfare. Moreover, this reorganization did not elevate even this broad grouping of health and social agencies to the level of a department. During the war, as emergency measures, new health and welfare activities were created and integrated with the Social Security Agency. As a second major reorganization President Truman, under authority from the Congress, in 1946 placed the Children's Bureau and other lesser health agencies of the federal government within the Social Security Agency.

The two reorganizations by executive order have brought together most, if not quite all, of the civilian health and medical activities of the federal government but has allied them with federal participation in education and welfare activities. This combination does not have departmental status. In the 79th Congress no less than three bills were introduced for the purpose of raising the Federal Security Agency to cabinet rank. These bills were considered non-partisan but received little support mainly because of opposition from medical, health, and educational champions who felt that the combination of health, education, and welfare in one department must inevitably result in the subordination of one to another.

Similar bills were introduced in the 80th Congress but were submerged by more politically potent issues. There seems to be general agreement that the 81st Congress will give serious attention to the creation of a new department which will include health. There is little likelihood that a department of health alone will be acceptable to the Congress, largely on grounds of efficiency and economy. The advantages of cabinet status must be carefully weighed against the disadvantages of a combination with other, not too closely related, activities.

INTERNATIONAL PUBLIC HEALTH

No discussion of public health in the changing order could be considered complete, particularly in these times of global planning, without reference to the participation by this country in international health organizations. Such participation is of long standing. The United States was active in the first Pan-American Sanitary Conference in 1902. Cooperation with the American Republics has been progressive since the establishment of the Pan-American Sanitary Bureau, the operating agency of the Conference. The purpose of this organization, as defined by this conference, is to promote and coordinate efforts of the countries of the Western Hemisphere to combat disease, lengthen life, and promote the physical and mental health of the people. The Bureau acts as a consulting office for the National Directors of Health of the American Republics, prepares the programs and publishes the proceedings of the Pan-American Sanitary Conference and the Conferences of the National Directors of Health, and carries out epidemiological and other scientific studies and investigations. It has maintained an extensive fellowship program to provide for study, particularly by Latin-American graduates in medicine and allied sciences.

The United States was also active in the development of the World Health Organization as a specialized agency of the United Nations. A conference was held in New York in June and July of 1946, attended by representatives of sixty-two governments. This conference developed plans for an active World Health Organization and drew up a constitution which was signed by all representatives, very few of whom, however, had authority from their governments to formally commit them to the World Health Organization. The breadth of interest of this Organization is indicated by the preamble to its constitution which reads as follows:

"The States parties to this Constitution declare, in conformity with the Charter of the United Nations, that the following principles are basic to the happiness, harmonious relations and security of all peoples:

Health is a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity.

The enjoyment of the highest attainable

standard of health is one of the fundamental rights of every human being without distinction of race, religion, political belief, economic or social condition.

The health of all peoples is fundamental to the attainment of peace and security and is dependent upon the fullest cooperation of individuals and States.

The achievement of any state in the promotion and protection of health is of value to all.

Unequal development in different countries in the promotion of health and control of disease, especially communicable disease, is a common danger. Healthy development of the child is of basic importance; the ability to live harmoniously in a changing total environment is essential to such development.

The extension to all peoples of the benefits of medical, psychological and related knowledge is essential to the fullest attainment of health. Informed opinion and active co-operation on the part of the public are of the utmost importance in the improvement of the health of the people.

Governments have a responsibility for the health of their peoples which can be fulfilled only by the provision of adequate health and social measures."

Pending the acceptance of the World Health Organization by the necessary number of member nations, an Interim Commission was established to develop a program for the Organization, which was financed through funds made available from the United Nations. The Interim Commission developed a plan and organization to carry out the principles enunciated in the constitution. This Interim Commission gave first attention to specific disease problems of world-wide distribution and to matters immediately requiring international cooperation. Expert committees were set up in the following fields of public health: international quarantine, yellow fever, tuberculosis, malaria, venereal diseases, sanitary conventions, biological standardization, international lists of diseases and causes of death, habit-forming drugs, and the unification of pharmacopeias. These expert committees served as consultants on specific diseases or public health problems and made recommendations at the request of member nations. A fellowship program was set up to provide for the dissemination of new knowledge in medicine and public health throughout the member nations. Medical and public health literature was made available to member nations, particularly to those countries cut off from scientific developments during the war.

Acceptances were received in April 1948 from 27 members of the United Nations which was the number required to bring into being the World Health Organization as a permanent agency of the United Nations. It should be noted that acceptance from the United States had not been received at that time, nor had the majority of the American Republics accepted, presumably because they were waiting for action by the United States.

The first World Health Assembly for the permanent organization of the World Health Organization met in Geneva in June and July of 1948. The Congress of the United States had voted acceptance of the constitution with certain limitations just prior to the first World Health Assembly. Delegates from the United States presented qualified acceptance at the World Health Assembly and after considerable debate, the United States was seated as a member of the first World Health Assembly. The limitations placed upon the acceptance by the Congress were concerned with the qualifications of the Director General, the limitation of contributions by the United States, and with provisions for withdrawal on short notice. The long delay in confirming signing of the constitution by the representative of the United States and the qualifying of the acceptance in minutiae has not strengthened our position in this least controversial of all international cooperative efforts. Let us hope that it is not indicative of the role that this country is to play in public health in the changing order.

Psychiatry in Medicine and Society*

By THOMAS A. C. RENNIE, M.D.

Associate Professor of Psychiatry, Cornell University Medical School; Attending Psychiatrist, Payne Whitney Clinic, The New York Hospital

PERHAPS the simplest elucidation of the subject of this address would be the sharing of a day in the life of any one of a dozen of my psychiatric friends—provided, as most of them are, that he was one of those who recognize and respond to the social challenges of his specialty. I do not mean the kind of practitioner who is content to devote 8 hours a day for 2 years to the treatment of 8 patients. I mean those men who have been blasted out of their offices by the challenge of the rising tide of human distress; by the appeals to bring relief to masses of people; by the demands for psychiatric orientation; by the requests to give leadership to groups and organizations bent upon improving the abject plight of the hospitalized psychotics; by private and government agencies working in the field for the alleviation of the major evils; by the need for the teaching of young psychiatrists, and the growing hunger for knowledge of human personality evidenced by medical students in their demands for more and more hours of undergraduate teaching in psychiatry; by the insatiably curious and avid writers of the press and magazines; in short, by an expanding and explosive cry for help from a nation that has suddenly come aware of its emotional needs and problems, and which is obviously anxious and perplexed by its inadequacies of adjustment to a world that hourly threatens to destroy itself. Frightened people everywhere are looking to the medical profession for salvation, and to the psychiatrist particularly, for even behind the jokes and cartoons, and the Hollywood caricature of the psychiatrist, one can see the appeal, the fascination, the seeking of deeply troubled people in perilous times. One only gets the full measure of the perplexity when he sits down with a patient—any patient—and creates for a brief half-hour or so the atmosphere of confidence and strength in which that patient can take off his mask and have the relief of sharing his innermost uncertainties and quandaries. This, I maintain, is one of the major functions of the practice of medicine, in the performance of which psychiatric insights are imperative.

This emergence of the specialty has all come about in a brief three decades. Thirty years ago it would have been easy to define the role of the psychiatrist in medicine and society. Then he concerned himself largely with psychotic patients, he worked in isolated hospitals, he was aptly named the "alienist;" he was one of a small group of physicians concerned with gross mental aberrations; usually shunned and deprecated by his fellow medical men. Working so far from normal life, he had little to contribute to the understanding of everyday problems. He had just recently taken over the role of the minister and the philosopher in treating the mentally sick.

Committed from the beginning to the Aristotelian philosophy that the study of man belonged logically in the field of science, rejecting the dualistic views of the neo-Platonic school, he continued to insist that the behavior of man could as readily be studied as the phenomena of chemistry, physics and biology. Slowly his knowledge grew.

We owe to the genius of Freud the elucidation of the unconscious and the understanding of normal personality growth and development which was to lead psychiatry increasingly back into the field of general medicine. For out of these insights came an understanding of how human beings behave in health, in sickness,

*S. Weir Mitchell Oration XI, The College of Physicians of Philadelphia, delivered 5 January 1949.

and in convalescence, of how the personality is inextricably woven into the cause and course of all disease processes, whether infectious, chemical, or metabolic, and of how specific emotions such as anxiety, fear, anger, resentment, hostility, and inner conflicts contribute to the wide range of pathological processes that fall into the domain of every physician. Out of this was born—I might better say aborted—the field of psychosomatic medicine, with its many false promises, but with its essentially healthy emphasis upon the point of view and the method of attack. Springing almost too facilely into being, the point of view seems here to stay in spite of its, as yet, unfulfilled promises, and its many empirical observations. Thus, in a sense, the cycle of medical growth has been completed and we are back where we started 2,000 years ago with Aristotle, in the recognition that everything man experiences and does is legitimately the area and responsibility of science, hence medicine.

It took the Second World War to bring psychiatry fully into the fellowship of medicine. For almost overnight a colossal problem of mental and emotional sickness became highlighted and demanded resolution. I need not review in any detail the size of the problem thus revealed.

Fifteen million men were examined at induction stations; 4,217,000 or 28.1 per cent were rejected; of these, 701,000 or 16.6 per cent were rejected for mental and nervous diseases and 582,100 or 13.8 per cent for mental deficiency; in short, 30.4 per cent were rejected for psychiatric difficulties; 320,000 men were granted C.D.D. for psychiatric disorders (or 41 per cent of all medical discharges). In addition, 137,000 were discharged for neuropsychiatric disorders under a nonmedical category.

These facts need not have been so startling. Long before the war it was known that an enormous problem in mental health existed in this country. Just to hospitalize the obviously sick civilian cases requires a service of approximately 900,000 beds, or 50 per cent of all the civilian hospital beds in America. Each year sees approximately 100,000 new cases admitted for hospitalization. One-tenth of one per cent of the population are so mentally defective that they need hospital care throughout most of their lives. Another 0.9 per cent are so defective as to need special provisions for supervision and training. Two per cent are so retarded that they live always at a marginal level and are in need of special education and training if they are to be made effective. Three-tenths of one per cent are epileptics, all of whom are in need of medical care and treatment. Three million are known chronic alcoholics.

There is no way of determining accurately the number of people who suffer from psychoneuroses of mild or serious nature. Statistics of the British National Health Insurance Scheme prior to the recent war indicated that of fifteen million insured, one-half sought medical attention each year, and that of these, 30 per cent suffered from nervous disorders. Internists in this country have estimated that from 30 to 60 per cent of people who go to doctors are suffering primarily from psychoneurotic difficulties, and that one person in five goes to a doctor yearly for some nervous ailment.

At the University of Chicago Hospital, 27 of 100 consecutive patients admitted to the medical services of the outpatient clinics are found to be neurotics, 23 had questionable organic disease, and only 50 had clear-cut organic disease. It has been estimated that from 12 to 20 per cent of all patients admitted to a general hospital present conditions and problems that are primarily psychiatric in spite of careful screening on admission to keep psychoneurotic patients out of the hospital. In the face of this tremendous need, it is disturbing to note that of 4,309 general hospitals in the United States only 112 provide for the care of even the mildest nervous, mental, or emotional disturbance.

Thus, a national health emergency of emotional casualties has fallen upon us. In the midst of this emergency, in February 1945, a group of medical and psychiatric educators drawn from civilian and military life met at

Hershey, Pennsylvania, to discuss the broad problem of psychiatric care for veterans. One outstanding fact emerged from those three days of discussion, namely, that the need is vastly beyond the limited number of 5000 psychiatrists available to meet it. It was agreed that for the treatment of minor psychiatric disturbances, both those directly related to war experiences and those in the population as a whole, it would be necessary to call upon the services of the 185,000 practicing doctors of America. Since most of these physicians have been poorly equipped by our usual educational procedures to comprehend or manage the problem, some training will have to be provided. There were many indications that practicing doctors wanted psychiatric orientation. In several states, half or more of the doctors questioned by the state medical societies as to their need for graduate education asserted their preference for additional training in psychiatric principles. Could such training be given briefly and effectively? The Army had proved that it could in brief 6 week or 2 month courses. The same proof came in the course of orienting civilian doctors in 2 crowded weeks of teaching at the pilot course given at the University of Minnesota in 1947. The results obtained were startlingly positive and indicated that general physicians can in a relatively brief fashion be taught the simple and effective principles of the psychiatric understanding and management of everyday problems of medical practice. Something of the flavor and excitement of that experiment comes through the printed pages of lectures and seminars in the book entitled, "Teaching Psychotherapeutic Medicine."[1]

But rather than burden you further with generalizations now, let me present briefly a sample of an everyday kind of medical problem. This was a routine consultation three weeks ago. In the discussion of it, one can see not only the personal problems of an individual in our society, but we can also have a look at the society in which we live and view some of the factors that surely contribute to the rising tide of illness, neurosis, delinquency, divorce, and the multiple other signs that give evidence of a sick society. Psychiatry and medicine have a role to play in their resolution, and even though our knowledge is far from complete, some of our insights may help in part of the answers.

Case 1. This is a man of 48, referred for consultation not by a physician, but by the president of the firm of which the patient is secretary-treasurer. They were concerned about his increasing inefficiency at work, about excessive drinking, and about their desire to retain a valued partner whose health seemed to be slipping. The patient acquiesced readily enough to psychiatric evaluation, but when he appeared at the office, considerable anxiety was evident behind his well-dressed, authoritative, successful executive's appearance. He sat stiffly in his chair, reached immediately for his pipe, with which he ceaselessly toyed for fifteen minutes, seemed inordinately flushed of face, and somewhat superior in manner. His first complaint revealed his real concern. He spoke of having been refused life insurance eight years ago because of an elevation of blood pressure, although in subsequent years he sought no medical help, presumably in an effort to deny the existence of the difficulty. Taking his own lead in conversation, he spent fifteen minutes reviewing his somatic status, but still offering no statement about personal difficulties at work or at home. Then his conversation spontaneously led to the office, to the president's concern about him, to his own fear that he was slipping on the job, and to his deep anxiety that he lose his position and jeopardize a life-time of hard-earned financial security.

By the time a half-hour had elapsed, he sat at ease, his jocular manner had disappeared, he was speaking freely with few questions on my part, and he was describing in considerable detail the increased pressures at work due to merger and expansion, his enhanced responsibility for 1400 employees, his over-conscientiousness of detail, his inability to delegate authority to others, his crowded briefcase, his three hours of work nightly at home, his aban-

[1] Witmer, H. L., *ed.* N. Y., Commonwealth Fund, 1947.

donment of all recreational outlets in the past five years, his having taken no vacation for ten years. Clearly these pointed toward a compulsive individual who was hoping to ingratiate himself and increase his own value to the firm by over-conscientiousness and overtime hours.

By now we were able, by gentle questioning, to inquire into other aspects of his life. He seemed to trust me and to be willing to go further into his personal perplexities. In the next half-hour, in response to a few questions, he sketched the development of his own life. Born in poverty, bereft by his father's death when he was eleven, deeply attached to his mother until he was thirty, (when he married), he was forced to leave High School before graduation, to accomplish an accountancy course at night school, to start work at the very bottom rung of his present firm, and in twenty-seven continuous years with the same organization, to rise to officer status. He discussed his life-long sense of inadequacy based upon his incomplete education, his difficulties in achieving social ease with men of college education, his dependent and unaggressive relationship with all superiors, his increasing resentment of the heavy load placed upon him, his constant fear that he be dismissed from the organization.

Before the hour was over, he was talking eagerly and freely, discussing his unhappy marriage, his dwindling sexual potency, his concern over his defiant adolescent son, his grief at the death of his closest friend following a sympathectomy for hypertension. He had given up religion when he was seventeen, felt the need of return to some kind of religious pattern, but was unable to find a satisfying theology. He gave an apt description of his own personality: restless, unable to relax, increasingly irritable at home, shouting at his children, sleeping fitfully, feeling impelled to keep up with the Jones's, spending too much on club memberships which he never used, entertaining lavishly with cocktail parties; but finding no serenity, no satisfaction and no real relaxation in anything he did. Repeatedly he returned to the subject of hypertension, describing how his father died of a stroke at 45, his mother of angina at 68, his brother of suicide at 30. Only toward the very end did he bring up the question of alcohol, the major topic of concern to his employers, which thus far I had not introduced into the conversation. With a burst of ill-concealed resentment, he then revealed that the president of the firm had bluntly told him that he had been drinking too much and that it was evident in his confusion at the office. At first, needing to deny the accusation, he minimized the drinking but, bit by bit, in unguarded sentences, he revealed his intolerance of alcohol, the confused thinking on the morning after drinking, the numerous high-powered luncheons he had to attend and the two or three cocktails which made him feel at ease but left him ineffectual for the rest of the afternoon; the relief of the late afternoon fatigue which he could get by stopping for two drinks in a bar on his way home, his wife's increased annoyance at his alcoholic intake, his awareness that "I admit I drink to be defiant, to build my ego, to be real brave with my wife, and at the office to show those big men that I am their equal."

Thus, in an hour and a quarter, this man had revealed himself with surprising frankness as a deeply anxious, compulsive individual, fundamentally passive, but reacting with defiance; amiable and friendly, but filled with suppressed anger and hostility, smouldering just beneath the surface with unexpressed anger towards his wife, his children, and his business superiors. At the end, he turned to me with the most evident relief in his expression and bearing, saying, "This has been an extraordinary experience—all my life I have needed a father-confessor; I have wanted so long to tell these things to someone. I feel more relieved at this moment than I have in months."

Obviously, the hypertension issue must take precedence in my investigation. He readily acceded to three days' study in the New York Hospital under a colleague in internal medicine. There, on admission, his blood pressure was found to be 220/130, but blood chemistry

studies, renal function test and liver function tests, revealed intact function. During complete relaxation under intravenous sedation, the blood pressure level dropped to normal, thereby revealing a reversible and hence essential hypertension, not too advanced in severity in view of the lack of evidence of arterial changes. The patient readily agreed to further psychiatric therapy. He undertook to reduce his weight, to eliminate alcohol, to plan his life for adequate recreation, to spend less time in the office and, reassured by his president (in collaboration with us) of his great value to the company and their desire to keep him and to protect his health, to allocate more of his responsibilities to younger executives. Within three weeks he was noticeably improved, the level of his blood pressure had dropped and he had embarked upon a more thorough-going exploration of his fundamental anxieties and their relief through ventilation and understanding of himself. There is every reason to believe that, with further help, the man will prolong his own life and effectiveness.

There are many aspects of this man's story that touch immediately upon my thesis of the evening, "Psychiatry in Society." His story high-lights some of the major stresses that beset most people in our present society. In recapitulation, they are: the dynamic significance of a broken and troubled early home life; an educational process that taught him nothing about living or the understanding of himself and others; the loss of religious faith at a time when religious belief would have brought comfort; a job situation characterized by the usual prevailing pressures, insecurities, competitiveness; the drive to get ahead; a marriage that was in jeopardy because of the total lack of preparation of both partners for the give and take which constitutes good marriage; a social existence that depends largely on alcohol for its lubrication; a frantic and unsatisfying existence, devoid of any of the leisurely outlets of creativeness, play or athletics and, most basically, a personal insecurity rooted in an over-evaluation of academic achievement, in a false set of standards and values, in smouldering resentment and intolerance of self and others, in deep perplexity about his own role as a male and a sexual being, in over-attachment and over-idealization of the mother, in an over-emphasis of aggressiveness coupled with a fear of passivity or dependency toward others—in brief, a typical example of a typical product of our Twentieth Century materialistic society.

Now it is evident that attention to the person himself, unraveling and undoing, ventilation and abreaction, and the realignment of values will bring this man help. Nonetheless, there are millions like him for whom no such help is available. Preventive psychiatry, as preventive medicine, must look to society itself and to the alleviation wherever possible of the outstanding stresses that make for neurotic development. To a psychiatrist so minded, the problems of society need diagnosis and treatment. Even had he no interests of this kind, he would be forced to give consideration to such issues because of the increasing demands set before him from the growing numbers of practicing physicians, psychologists, social workers, educators, ministers, employers, labor leaders, statesmen, and others who are begging for help in the solution of the neurotic problems which they daily encounter. Psychiatry, therefore, has moved forward from the area of treatment into the area of prevention. A new aspect of the specialty has arisen, a new science, if you will, called social psychiatry.

Let us look, therefore, briefly at several aspects of society and the particular problems which they present.

One of the most important is that having to do with the working conditions of people, not alone for the problems it presents in finding satisfactions, but from the increasing attention being given to the emotional needs of the worker himself. Here is a most vital area for mental hygiene activities. This much we know.

In America, there are one or two gainfully employed workers in most families, totaling fifty to sixty million people. Any phase of life that uses so much of the time of so many people

is sure to be significant for individual and family well-being. Aside from the sheer logic of numbers, it is generally agreed that congenial working relations and genuine job satisfactions contribute much to the mental health and stability of their families. This is true of everyone, from the high-salaried executive to the lowest paid unskilled workman. And not only does much of the well-being of the individual, while engaged in work and in off-duty hours as well, hinge on his employment and work satisfactions; the social and economic stability of the country depends on insuring these values for its workers. It is equally true, of course, that the family and home relations and attitudes affect the man's performance and satisfaction at work. Whether industry makes for health, stability, and full production or for anxiety, strife, and lowered production depends very much upon the accepted philosophy of work and the extent to which both employees and managers are able to derive genuine personal and social values from their work. That either the philosophy or the method has been inadequate is quite clear.

As Ford stated[2], "We have not yet solved the problems of mass production, for our failure in human engineering is creating waste and inefficiency which handicap the very purpose of mass production—lower costs." He backed this up by noting that 216,000,000 man-days of labor had been lost through strikes during the period 1927–1941 and that productivity per worker in industrial plants declined more than 34 per cent during the war period.

The proportion of workers who, for chronic or temporary causes, are at any one time unable to bear the emotional or physical stress of industrial work is variously estimated at 20 per cent and 40 per cent, and their numbers are said to have risen by 10 per cent during the war.

Psychoneurotic and maladjusted employees as a group constitute the largest number of "problem workers." Giberson finds that this group constitutes 25 to 40 per cent of all patients referred to the industrial physician.

The number of accidents in an organization is recognized as having a relation to the extent of maladjustment present. Giberson believes that 80 per cent or more of reported accidents are preventable and perhaps half of these are due to personal causes.

It is now known that, although some accidents are unavoidable, most of them occur as a result of an accident habit which is really an illness. According to the report of the National Safety Council, four million workers were killed or seriously injured during 1941, resulting in a loss of 460,000,000 man-days.

Another large group of employees is frequently absent because of illness. Because changes in muscle tonus are among the most frequent mechanisms of emotional expression, chronic complaints at the first-aid unit of aches and pains after no unusual exertion are fairly common.

Three major influences have been operating to further the promotion of mental health and morale in industry and, while the approach of each is different, the conclusions arrived at are similar.

(1) In the business of war it has been discovered that certain kinds of work, of risk, of responsibility, and of discipline improve men's spirits and that other kinds break them. New methods were devised to test and index trainees' aptitudes and abilities and to relate these to their mental and physical powers and their emotional stability. Job analyses of all occupations in the Army were matched against these "profiles" of enlisted men and women to determine the best possible placement. Though the range of jobs in the armed forces was very limited compared to that of peacetime occupations and consideration of immediate needs restricted it even more, the experience in the Army has demonstrated the value of this scientific approach to placement.

(2) Besides selecting and training for the job, the armed forces developed methods of building morale; particular consideration was shown for each man's personal welfare and

[2] Ford, Henry, II. The challenge of human engineering. Advanced Management 11: 48–52, June 1946.

value in the cooperative effort, and emphasis was placed on teamwork and social solidarity. These methods were effective in producing higher morale and efficiency in units whose officers had the necessary qualifications for social leadership.

(3) The concept that each man's potential in production is much higher than has generally been realized and that men are capable of great accomplishment and discipline when they share closely in a common enterprise under leaders whom they trust and admire proved its practical truth during the war. The time is ripe for its application to industry.

The British were so impressed with the improvement of their soldiers when consistent attention was given to building morale that at the end of the war they took most of the officers and enlisted men who had served in education and personnel work in the Army and set them to work in industrial plants. These veterans now train foremen to conduct group discussion and, with the full knowledge and approval of top management, a certain amount of time each week is devoted to free discussion by the workers under the foreman's leadership. No subject is taboo and full and free expression is encouraged. Observers have reported an amazing degree of improvement in the workers' sense of participation and in the morale of entire plants.

In brief, there can be high industrial morale, with contentment and happiness for both employees and managers, and industrial stability only when men feel strongly that what they are doing is worth-while and worthy of them, when all have a real sense of participation in the total task, when there is mutual acceptance of one another's contribution to the whole enterprise, and when there is congenial and democratic give-and-take in all working relationships.

The company or plant physician is generally regarded as the pivot of any program of psychiatric service to industrial employees. While plant physicians with some psychiatric training are handling an increasing number of the personality disorders of employees, they cannot meet the whole problem, and supervisors and foremen must be the next line of defense. Wide recognition is being given today to the importance of the supervising staff in the success of any mental hygiene program on a mass scale.

Many labor leaders have become convinced that shop stewards, union counselors, and members of labor-management committees should have as much understanding of human beings and skill in relationships as managers and foremen. The clinic approach in handling grievances has proved more effective than formal legalistic procedures, and unions are setting up training programs for those who represent to the employers the interests of the workers. The unions are also asking for the insights of psychiatry.

Let us look briefly at the second area of stress, namely, the school, for it is here more often than is realized that stable personalities can be made or broken. Education has not yet faced up to its prime responsibility in educating for character and personality stability. Many normal schools still give no courses in personality development although they turn out teachers by the hundreds who will directly affect the lives of children, affecting them by their own unconscious hostilities and hatred, by their own neurotic conceptions, by their lack of understanding of the needs of children, by premature forcing of the learning process, and by thinly disguised punitive behavior. Psychiatrists emphasize the importance of the first six years in the home for personality growth; they too frequently fail to emphasize the destructiveness of school environment.

Only recently has it been realized that learning is not the activity of a single function but is bound up with the total personality of the learner, and that mental health is as essential to the learning process as intelligence. Moreover, what children learn in school has no value in itself, but only as it can be used and applied in their daily living as children and as adults. Therefore, the school has the responsibility to develop attitudes and resources, a point of view toward themselves and others, an inner balance and security, which make it possible for chil-

dren to function as human beings in a human society. In short, mental health is an inseparable part of education.

It is almost axiomatic that the mental health of pupils can be promoted consistently only by teachers who are healthy minded and who understand the children they teach. But teachers' mental health, like everyone else's, is tied up with their status in the community. If public apathy and penuriousness refuse them an adequate income, they will seek more rewarding employment. As a matter of fact, since 1941–1942, 280,000 teachers have abandoned the profession.

A child's relation to his teacher is of crucial importance to him. Fear, frustration, or hostility induced by his school experience can develop or exaggerate patterns of behavior which will determine his whole life adjustment. Teachers who realize this recognize that one of their chief qualifications is to understand the needs of children and to use methods that develop confidence, trust, and cooperation.

Understanding children involves emotional values which transcend ordinary knowledge of psychological principles. We may state them for the teacher in summary form.

1. *Behavior is caused.*
2. *All human beings are inherently valuable.*
3. *Each individual is unique.*

Like the family, the school is a laboratory in the techniques of relationships. A teacher in the kindergarten or first grade carries the children's projection of a mother. If she is not a "good mother," the first days of school are traumatic. There must be a continuation of the atmosphere of warmth and trust that the young child needs if he is to develop a sense of personal security; and special consideration and attention have to be given to children whose home life has given them the handicap of overdependence or patterns of negative response.

As the children grow older, their personalities develop through identification with someone who carries other values than those which are characteristic of the mother—someone who crystallizes their need to use and develop their innate social and intellectual powers. The teacher often becomes the object of such identification, the ideal woman who is interesting and socially adapted, or the hero who excels intellectually or by force of personality.

Some interesting experimentation in human relations classes has been done in the last several years under the aegis of the Delaware Society for Mental Hygiene. It was found possible to include discussions of personal attitudes in human relations in all grades beginning with the first. In the upper grades actual relationship situations within the class, community, or nation are made of stories rich in attitude and relationship concepts and having the quality of human warmth and interest even though the characters are animals.

No matter how thoroughly imbued school staffs may be with the mental hygiene viewpoint, education cannot always achieve its goal of mental health and mature personality. In some children unhealthy patterns have been fairly well established by the time they enter school. In others, destructive forces in family and community cause continuing conflicts so severe that they cannot be fully resolved no matter how favorable the school environment may be. Consequently, there are in virtually all schools some children who need individual assistance. The percentage of children needing such service varies somewhat with schools and communities, but it has been estimated from studies in several communities that about 5 per cent of the children in elementary school at any one time require special study and treatment. To serve these children the full-time services of a clinic team consisting of one psychiatrist, one or two psychologists, and two or three psychiatric social workers is needed for every 40,000 children in the elementary school grades. Because of the added tensions associated with puberty, the development of sexual interests, and efforts toward emancipation from the parents, the percentage of high school students who would profit greatly by individual consultation or clinical study and

treatment is believed to be considerably higher (on the basis of a study in Cincinnati, 45 per cent).

Guidance and clinical work are needed at all levels of school to restore to health and social effectiveness those children and youths whose growth, integration, or socialization is being blocked by inner conflicts or environmental stresses. Equally important, if not more so, is the infusion of the clinic staff's viewpoint throughout the school, to the enrichment of teacher-child relationships and further refinement of the educational process.

The third area for scrutiny concerns man's search for security through religion and faith. The leaders of the church have come to recognize their own unpreparedness for the full role they might play in modern society, and in securing psychiatric insights have brought home to psychiatrists a fuller appreciation of the value of collaborative effort.

Dr. Richard C. Cabot, for many years professor of social ethics at Harvard Medical School and eminent leader in medical and social work education, was responsible for the statement that the minister could be doing 75 per cent of the healing work of the physician and could do some of it better than the physician if he knew his business. Such was his estimate of ministers' opportunities for mental hygiene service. He recommended that to equip them for this work all divinity students should be required to work one year under supervision in a general hospital or social case work agency. Considering that there are 140,000 ministers of all faiths in the United States, the potential contributions of ministers to mental health are obviously large.

Supervised clinical training in hospitals and agencies was initiated in 1923 and to date approximately 2,000 clergymen and theological students have had a significant period of internship. Larger numbers have attended extension courses in mental health offered by theological schools, and the literature for ministers has been growing in volume and in quality. The schools have been reviewing their curricula, and in 1941 Hiltner estimated that 18 of the 90 schools in the country had on their faculties men who had been trained to teach pastoral work through separate clinical study.

Wartime experience has greatly increased both the sense of need for such training on the part of the clergy and the opportunities to secure it. Chaplains in the armed forces found that from 50 to 75 per cent of their time had to be devoted to personal counseling. Some of these nearly 10,000 chaplains had been trained for this work but many had not. A small amount of training was provided by official chaplain courses, and this was supplemented substantially by counseling seminars conducted by competent leaders at large military posts. These were intensive, three-to-five-day courses attended by Protestant chaplains and any others who wished to participate and later by civilian clergy and by professional personnel of the U.S.O. Seminars were held in almost every state, with the heaviest concentration in the states where the clergy had paid least attention to this subject. Total attendance was about 1,500 chaplains and 3,500 civilian clergy. Literature on counseling prepared from the point of view of the clergy was widely distributed to chaplains and other clergy working with military personnel.

Clergymen who think and care about other people know that being our brother's keeper means stepping out of the world of the Bible and out of modern church buildings into homes, streets, factories, and stores. They know that it means constant hard work in local communities the world over, as well as in international conferences, to build a world organization that will both win and hold the peace.

The eager pursuit of such a worth-while purpose which is shared with others is one of the surest ways to achieve and maintain mental health.

I might multiply such examples of social psychiatry many times over. The important fact that we as physicians must face is that mental health cannot be developed in a social

vacuum. Powerful factors operate against it as our present society is constituted. To promote positive mental health will therefore require the cooperation and help of many individuals and groups. Medical and social scientists need to look squarely at these factors and, abandoning professional isolationism, cooperate in an effort to counteract them. Mental health can only be achieved in an environment which provides opportunities for self-expression, social usefulness, and the attainment of human satisfactions. Preventive psychiatry is only beginning, and its only sure tool at present lies in educating the public in the meaning and causes of emotional disorders and the ways of developing positive mental health.

We know that every neurosis has its real basis in the early life of the individual, particularly in the relationship of the child to his mother and father, his brothers and sisters. And so, a generation of children who have been well loved, who are wholesomely self-confident, who have disciplined their instinctive drives and harmonized self-interest with enjoyable give-and-take with others, who can think critically and objectively, who have become accustomed to making decisions while adapting to change, and whose personalities are well integrated and mature, are the best guarantee that problems of human relationship can and will be worked out. When the dynamic processes of growing up are made to serve positive and constructive ends, conflict, fear, and hostility can be kept within bounds and the danger of disabling psychoneuroses diminished.

During the war, the key to morale in our fighting forces was leadership. In building and maintaining a peaceful society, leadership is equally important. One of the secrets of a healthy society, nationally and internationally, is the selection and training of potential leaders in all professions and major fields of activity. Such leaders must have an understanding of individuals and groups and of the history and heritage of different nations. They must have a mature personality, enough dissatisfaction with the status quo to call forth aggressive, constructive effort, and enough social concern and devotion to hold them to their course while a healthier society is slowly but surely constructed. They need thorough grounding in the knowledge of human motivation, and their training must include understanding of the findings of psychiatry and the other social sciences.

One of the most effective means of building morale and preventing psychiatric disorders in the armed forces was the prompt discovery and alleviation of such environmental stresses as discomfort and inconvenience, wasted effort or unfairness, and defective or untrustworthy leadership. The experience of psychiatrists, social workers, and plant managers shows that in a peacetime society the same relationship between mental health and environmental stresses holds. As stresses are multiplied in number and increased in intensity, there is a corresponding increase in the number of people who can no longer function effectively, and, conversely, as stresses are removed or alleviated, the number of people who are mentally healthy is proportionately increased. One of the most powerful environmental stresses, and one to which millions of people are exposed, is economic insecurity.

The extent to which economic insecurity contributes to psychoses, psychoneuroses, delinquency, crime, and other social problems is not absolutely clear. There was no appreciable increase in admissions to hospitals for the mentally ill during the economic depression of the nineteen-thirties, but there was a marked increase in the number of psychoneurotic persons whose illness became so serious that they had to be hospitalized. The anxieties created by unemployment and loss of income have been experienced by so many millions of people, and their expression—in irritability toward members of the family, heightened group conflicts, loss of self-respect and the esteem of the community, and in many other ways—has been so commonly observed that statistical proof of such ill-effects is not needed.

Through social insurance in the form of un-

employment compensation and old age security and through public assistance, the federal and the state governments have attempted to prevent the worst effects of economic insecurity. There is clearly a need to extend social insurance to the many groups of employees not now covered by the provisions of the law and to extend security against accident and health hazards to those who become disabled and are left without earning capacity by reason of non-industrial disablements.

If our free enterprise system is to function adequately, private business and industry must do much more to stabilize employment and guarantee economic security, and labor groups must develop real leadership and take steps to assure full productivity. It is necessary for both groups to take aggressive steps to achieve and maintain full employment, that is, to give everyone the opportunity for steady, gainful, satisfying employment on a year-round basis.

We are fortunately members of a great political philosophy known as democracy, for democracy and good mental health are interdependent. Whatever fosters and promotes democracy also guards and advances mental health. Conversely, whatever breeds racial, religious, or other group prejudices and intolerance accentuates the tensions of all the members of the out-groups and gives them handicaps which largely negate the values of democracy. The problem of intolerance, particularly toward these out-groups, has not yet been solved. Prejudicial attitudes are acquired largely from parents, relatives, and neighbors during early childhood, and are confirmed by habitual emotional reactions that are so strong and so deeply imbedded in the personality structure that they yield only to prolonged critical examination in a social situation that puts a premium on their opposite. In the case of many individuals release from prejudice can be effected only by psychological or psychiatric treatment which allows the unconscious hostility to express itself.

We know that intolerant people are people who hate. Their degree of intolerance is a measure of their hate. When a person is characteristically intolerant, he belongs to the group of the psychologically hostile. The most distinctive finding among the psychologically hostile is a stultification of the personality. In a well-known personality test such individuals, for whom hatred is so vital a function, are found to be characterized by a marked narrowing of the thought, feelings and imagination.

The disseminator of intolerance, operating on the fertile soil of the psychologically hostile, may initiate an epidemic of hate, as readily comprehensible as an epidemic of typhoid fever. The source of either epidemic, whether of typhoid or hate, would be considered equally dangerous and criminal, if public understanding of mental health were at all effective. And while the problem remains unsolved, social scientists have made a beginning.

In the last five or six years a wealth of material has been published which suggests constructive ways of dealing with the problems of minority groups who are not fully accepted or who are actively rejected. An interesting series of pamphlets has been recently published by the National Institute of Social Relations under the title *Talk It Over.*

And thus as we look about our disordered society, we see many areas in which psychiatry has a responsibility: first for research and study, then for action and therapy. In the home and in family education, in the school, the court, the factory, the community, psychiatric principles are desperately needed and a major job in education remains to be done.

What is needed today is a new philosophy which does justice to our social and emotional needs and which builds a new and more inclusive morality based on these needs. We need a clear understanding of the nature of our world and a conviction regarding man's place in it that is scientifically tenable, socially acceptable, and emotionally satisfying. Such a faith springs from an appreciation of harmonies of sight and sound, evidences of cosmic purpose, and a sense of personal integrity—experiences

which have been to a great extent the basis of established religion. But it builds also on our scientific knowledge that the natural world is governed by laws which are fully trustworthy and quite as wonderful and awe-inspiring as the mysterious powers of the supernatural to which our forefathers gave allegiance.

A faith adequate for our age must embody a view of man and society which gives purpose and meaning to each man's life, allays men's fears and distrust of one another, and induces and maintains such mutual confidence, cooperation, and support as are needed for living together in families, groups, societies, and nations.

William James suggested many years ago that to maintain peace one must provide moral equivalents for war. That this will not be easy is clear from Flugel's summary of the values that war has for the individual and the nation:

"The problem of providing a substitute for war that shall have something approaching war's peculiar combination of moral and instinctive appeal, is far from easy. In its danger, its hazards, its call for heroism, effort and sacrifice on the part of whole communities, war is without parallel—as also in the sense of social cohesion that it brings and the amount of aggression it permits. Such a moral equivalent to the values of war can be provided if home and school encourage personality development and social relationships, and if business and industry, government, and voluntary community groups provide maximum opportunities for people to work together in a common cause."[3]

The safeguarding of mental health and the development of satisfactory human relations are very large tasks, and they must be shared by parents, teachers, doctors—especially psychiatrists—social workers, psychologists, clergymen, business, industrial and labor leaders, and by all others who are in a position to lead and influence the lives of people.

A really fine job of public education concerning emotional and mental stability remains to be accomplished, but there are many socially-minded members in medicine who will rise to the responsibility. Professional persons and enlightened laymen can surely justify their existence in the world of today only by working where and how they can to implement the conviction of Professor Henry deW. Smyth, as stated in the War Department's report on the atomic bomb: "If men, working together, can solve the mysteries of the universe, they can also solve the problem of human relations on the planet. Not only in science, but now in all human relations, we must work together with free minds."

To find the solution to some or all of these problems is the real challenge that faces the psychiatry of tomorrow.

[3] Flugel, J. C. Man, morals, and society, Chapter XIX. New York, International Universities Press, 1945.

Memoir of Solomon Solis-Cohen*

By AUGUSTUS A. ESHNER

IT is a privilege to pay this tribute to the memory of a friend of long standing, an honored senior colleague, a distinguished practitioner and teacher of medicine, a worthy Fellow of this College and an exemplary citizen.

Solomon Solis-Cohen was born September 1, 1857, in the city of Philadelphia, where he died July 12, 1948, full of years and of honors and of accomplishment, after a long and useful career in varied fields of endeavor.

He was an exceptional and outstanding product of the public school system of his native city, to whose administration he made in later life substantial contribution. He was an ardent advocate of a City College of Philadelphia.

Dr. Cohen was graduated from Central High School with honors in 1872, receiving the Bachelor's Degree at that time and the Master's Degree five years later. He was graduated from Jefferson Medical College in 1883.

He served successively as Chief Clinical Assistant in the Out-patient Medical Department of Jefferson Hospital (1884), Lecturer on Special Therapeutics (1885), Clinical Lecturer on Medicine (1888), Assistant Professor of Clinical Medicine (1902), Professor of Clinical Medicine (1904–27) at his Alma Mater, becoming Emeritus Professor in 1927. He was Physician to the Hospital of Jefferson Medical College from 1902 to 1927 and thereafter Consulting Physician.

He was Professor of Clinical Medicine and Therapeutics at the Philadelphia Polyclinic and College for Graduates in Medicine and Physician to its Hospital from 1887 to 1902.

He was Lecturer on Therapeutics at the Medical School of Dartmouth College from 1890 to 1893.

He was Physician to the Philadelphia General Hospital and to the Jewish Hospital from 1887 to 1927, and thereafter Consulting Physician.

He was Physician to Rush Hospital for Consumptives from 1890 to 1920; Consulting Laryngologist to the Pennsylvania Institution for the Feeble-minded at Elwyn, 1894, 1895; Consulting Physician to the Pennsylvania State Hospital for the Insane at Norristown from 1900 to 1924.

He was a member of the Board of Managers of the Municipal League of Philadelphia from 1893 to 1896.

He was one of the Founders of the National Tuberculosis Association in 1904.

He was a Trustee of the United States Pharmacopeial Convention from 1920 to 1940.

He was a member of the Philadelphia Board of Education from 1925 to 1943, and to the deliberations and activities of this body he made wise and constructive contribution. His memory is perpetuated in the Solomon Solis-Cohen Elementary Public School.

He served as Director of the School of Design for Women from 1927 to 1930.

Dr. Cohen was a member of many and varied learned, cultural and scientific organizations, at home and abroad, and he held official position in a number.

He was President of the Philadelphia County Medical Society in 1898 and 1899.

He became a Fellow of this College in 1888.

He was awarded the Honorary Degree of Doctor of Hebrew Literature by the Jewish Theological Seminary of America in 1928; the Honorary Degree of Doctor of Science by Jefferson Medical College in 1933 and the same Degree by the Philadelphia College of Pharmacy and Science in 1939.

Dr. Cohen was a prodigious worker and a

* Read before the College of Physicians of Philadelphia, 2 February 1949.

prolific contributor to the art and the science and the literature of his profession. His masterpiece was A System of Physiologic Therapeutics, in 11 volumes, published in 1901–5 and of which he was Editor.

He was a poet of charm and grace, with a strength and beauty of imagery and expression. His verse has found a permanent place in literature.

Dr. Cohen's artistic faculty found outlet in work in pastel and in painting in oil at a period when relaxation of the pressure from professional obligations permitted its exercise.

The declining years of his life were clouded by a cruel, progressive malady that brought physical disability, without obscuring the native clarity of his mind or repressing the vital buoyancy of his spirit.

Dr. Cohen was an ornament to his profession and a pillar of strength in the divers fields in which he exercised his talents. He was a keen and critical observer of clinical phenomena, an acute and discerning diagnostician, a sympathetic and helpful consultant and a resourceful therapeutist of wide horizons. He was a persuasive and convincing teacher, who kept fully abreast of the advances in his field of activity and maintained a lively interest in his students.

He was to many, equally of low degree as of high estate, the beloved physician, a beacon of cheer and of hope, a token and a symbol of escape and recovery, a bulwark of defence in the face of sickness and adversity.

Dr. Cohen was a man of exalted intellectual caliber and stature, both quantitatively and qualitatively, and he exerted an elevating and forward-looking influence in the spheres of activity in which he participated. He was possessed of strong convictions, and fortified with the courage stoutly to proclaim and defend them.

He had a passion for precision and truth and for justice and right, in practice as in principle. He was eloquent and forceful in the written and in the spoken word, and his diction attained a high degree of perfection. He had a profound interest, and at times he took an active part, in civic and communal affairs, and always on the side of progress and reform.

Dr. Cohen represented the confluence of his ancestry. To his descendants he has transmitted the custody of a precious heritage tenderly to be cherished.

Catalogue of the Mütter Museum of the College of Physicians of Philadelphia

Compiled by ELLA N. WADE, *Curator*

PARTS III–XI*

PART III

COMPARATIVE ANATOMY

A. Bones of Animals
  1. Normal
  2. Pathological
    a. Fractures and Injuries
    b. Diseases
    c. Abnormalities
B. Internal Anatomy of Animals
  1. Normal
  2. Pathological
C. Embryology
D. Congenital Abnormalities

PART IV

PARASITES

PART V

COLLECTION OF CALCULI

PART VI

FOREIGN BODIES (see also nuclei of calculi)

PART VII

INSTRUMENTS

A. Anal and Rectal Instruments
B. Anesthetic Apparatus
C. Antiseptic Apparatus
D. Aural Instruments and Acoustic Appliances
E. Cupping, Phlebotomy and Leeching Instruments
F. Dental Instruments
G. Diagnostic Instruments
H. General Purpose Instruments and Apparatus
I. General Surgical Instruments and Appliances
J. Gynecological Instruments
K. Instruments for Intestinal and Hernia Operations
L. Maternity Instruments
M. Microscopes and accessories
N. Nose and Throat Instruments
O. Obstetrical Instruments
P. Ophthalmic Instruments
Q. Urethral Instruments
R. Foreign Instruments
  1. Chinese
  2. Japanese
  3. Korean
  4. Replicas of instruments found in the ruins of Pompeii

PART VIII

LANTERN SLIDES

PART IX

MICROSCOPIC SLIDES

A. Scientific
B. Historical

PART X

HISTORICAL GIFTS TO THE MUSEUM

A. Medical
B. Military
C. General

PART XI

PHOTOGRAPHS, SKIAGRAPHS AND DRAWINGS

PART III

COMPARATIVE ANATOMY

A. Bones of Animals

A. 1. Normal

Skeleton of
—chicken adder. 13670. A 1.
—dog. 13665. A 1.
—frog. 13012. A 1.
—snake (non-venomous). 13525. A 1.

* Part I was published in the *Transactions & Studies of the College of Physicians of Philadelphia 15:* 74–89, June 1947; Part II. 1, section 1, *ibid.* 15: 128–143, December, 1947; Part II. 1 (section 2)–5, *ibid.* 16: 129–146, December, 1948. Reprints of the parts, as published, are obtainable from the Curator of the Mütter Museum.

Skull of
—agouti. 1660.34; 1660.35. A 14.
—alligator. 13014; 13013. A 1.
—armadillo; portion of. 1660.52. A 14.
—baboon. 1660.02. A 14.
—bald eagle. 1660.512. A 14.
—bear. 1660.12; 1660.14. A 14.
—calf (cross-section). 1660.44. A 14.
—cat. 1660.295; 1660.309. A 14.
—portion of. 1660.30. A 14.
—chimpanzee. 1660.09; 1660.10.
—deer. 1660.50. A 14.
—dog. 1660.15; 1660.16; 1660.17; 1660.23; 1660.24. A 14.
—section of. 1660.18; 1660.19; 1660.22; 1660.306; 1660.307. A 14.
—gorilla. 1660.105. A 14.
—ground hog. 1660.36. A 14.
—portion of. 1660.37. A 14.
—horse. 13660; 13655. A 1.
—monkey. 1660.00; 1660.01; 1660.08; 1660.106. A 14.
—muskrat. 17830.43; 17830.44; 17830.45. A 35.
—one of musteline family. 1660.11. A 14.
—orang-outang. 13582.
—paca. 1660.32; 1660.33. A 14.
—water pig. 1660.40. A 14.
—porcupine. 1660.42; 17830.35. A 14.
—rabbit. 1660.31; 17830.37; 17830.38. A 14; A 35.
—rattle snake. 13580; 17830.61. A 8.
—rattles of. 17830.62.
—rodent (unidentified). 1660.425; 1660.435. A 14.
—sheep. 1660.45. A 14.
—skunk. 1660.305. A 14.
—squirrel. 17830.39; 17830.40; 17830.41; 17830.42. A 35.
—tiger. 1660.29. A 14.
—green sea turtle. 1660.51. A 14.
—wallaby (portion). 1660.54. A 14.
—woodchuck. 1660.39; portion. 1660.436. A 14.

Maxilla of
—ground-hog. 1660.37. A 14.
—monkey. 1660.07. A 14.
—opossum (portion). 1660.53. A 14.
—shark. 17830.55.
—woodchuck. 1660.39. A 14.

Mandible of
—deer. 1660.46; 1660.47; 1660.48; 1660.49. A 14.
—dog. 1660.20; 1660.21. A 14.
—sheep-head fish. 1660.511. A 14.
—monkey. 1660.03; 1660.04; 1660.05; 1660.06. A 14.
—muskrat. 1660.38. A 14.
—shark. 17830.552.
—wolf. 1660.25; 1660.26. A 14.
—wolverine. 1660.27; 1660.28. A 14.
—woodchuck. 1660.41. A 14.

Tooth
—of beaver. 1660.43. A 14.

Vertebral column
—of porcupine. 17830.35.
—and pelvis of
—macaque. 17832.53. A 11.
—roe deer. 17832.52. A 11.
—skunk. 17832.54. A 11.
—sun bear. 17832.50. A 11.
—wolf. 17832.51. A 11.
—zebra. 17832.49. A 11.

Penis bone
—of walrus. 17830.48.

A. 2. Pathological

A. 2. a. Fractures and Injuries

Femurs of *turkeys*
—united and ununited. 13026.00.
—united with deformity. 13020.00; 13020.05; 13021; 13025.

Metatarsus of *deer*
—united. 13027. A 174.

Skeleton of a *frog.*
—tibia ununited. 13010.

Sternum of *chicken*
—united. 13028.

Elephant's tusk (section)
—containing bullet. 13620; 13630. A 15.

A. 2. b. Diseases

Caries
—in skull of
—dog. 13583.00.
—gorilla. 1155.03; 1176.04. B.
—in elephant's tusk. 13600.00.

A. 2. c. Abnormalities

Tooth
—of a badger shown in the floor of the nasal cavity. 1660.308; C-274. A 14.

B. Internal Anatomy of Animals

B. 1. Normal

Heart
—of calf. 1066.05; 13071. A 14.

Arteries
—carotid and vertebral, of rabbit; ligature of. 2069. A 15.
—and veins; corrosional preparations showing arterial and venous distribution in the digestive, urinary and respiratory organs and spleen of many animals. 10003 (Cr.) to 10006 (Cr.); 10010 (Cr.) to 10024 (Cr.); 10026 (Cr.) to 10033 (Cr.); 10038 (Cr.); 10039 (Cr.); 10040 (Cr.); 10041 (Cr.); 10043 (Cr.); 10048 (Cr.); 10051 (Cr.); 10053 (Cr.); 10054 (Cr.). B 4.

Lymphatics of
—horse
—diaphragm. 2227. B.
—superior maxilla and nasal chamber. 2226. B.
—vomer. 2225. B.

Brain of
—ape. 8257 (M).
—baboon. 8258 (M).
—chimpanzee. 8253 (M).
—fox-like canine. 8260 (M).
—gorilla. 8256 (M).
—monkey. 8259 (M).
—orang-outang. 8255 (M).

Tongue
—of swan. 13060.

Ear
—ossicles of vertebrate animals. 1059.015 to 1059.172. B 4.
—labyrinths of mammals. 1100 to 1100.104. B 4.

B. 2. Pathological

Actinomycosis in lower animals. 13115.

Anastomosis: experimental surgery on dogs
—intestinal. 3077; 3077.30; 3077.60; 3077.70; ileo-colic rings in place. 3077.40; six feet of small intestines excised; union of divided end by Czerny Lembert suture. 6032.1. A 117.

Bezoar. 14682; 14724.

Calculi
—from a horse
—intestinal. 14071.5.
—salivary. 14342.5.
—fecal concretions. 14342.4.
—from opossum; renal. 14001.4.
—from oyster; carbonate of lime and pearls. 14001.5. A 15.

Concretions from a rattle snake. 14697. A 8.

Hair ball. 14343.3.

Hairy tumor from chin of a calf. 13051.

C. Embryology

Embryology of a *chicken*
—twenty-four stages in development of non-incubated impregnated egg to time of hatching (21 days). 1090.019 to 1090.42. B.
—in four stages. 1090.043 (M). B.

Fetal cat in its membrane. 13040.

Fetal marmoset (twins), with placenta. 13041. A 53.

Uterus of *cat*, impregnated. 13030.

D. Congenital Abnormalities

Bird with *third wing.* 7080.

Chicken with *two heads.* 7070. A 175.

Pig with *extra proboscis* descending from forehead above and between the eyes. 7060.

PART IV

PARASITES

Ascarides lumbricoides. 12400; 12405. A 27.

Bot fly larvae and portion of stomach of a horse. 12200. A 179.

Filaria sanguinis from heart of a dog. 12300. A 161.

Tapeworms. 12100; 12100.1; 12110; 12115; 12120; 12125; 12130. A 27; A 147.

Worms from bladder of a child who had symptoms of stones. 12105.

PART V

COLLECTION OF CALCULI

Biliary calculi
—14443; 208 removed from a single bladder. 14663; 14664. A 8; A 195.
—gallstones. 14260.4; 14672; 14673. A 27; A 195; A 200.
—and urinary. 14002.1. A 15.

Calculi
—locations and ingredients not specified. 14001.8; 14003.1; 14081.1; 14143; 14159.1; 14164; 14165; 14168; 14173; 14176; 14177; 14178; 14179; 14181; 14193; 14194; 14196 to 14199; 14302; 14304; 14305; 14306; 14308; 14309; 14320; 14322; 14425; 14255; 14256; 14235 to 14239. A 15; A 197.

Calculi
—in which predominating ingredients are
—oxalate of lime. 14122; 14298; 14300; 14444. A 15; A 46; A 195; A 197.
—and phosphate of lime. 14140. A 15.
—and phosphate of ammonia and magnesia. 14153. A 15.
—phosphate. 14275 to 14278; 14283; 14284; 14285; 14287; 14299; 14301; 14303. A 195; A 27.
—phosphate of lime; fusible. 14180.
—urate of ammonia and oxalate of lime. 14101. A 15.
—uric acid. 14280; 14281; 14282; 14286; 14288; 14289; 14290; 14291; 14292; 14293; 14295; 14296; 14297; 14307. A 15; A 195.
—urate of ammona and lime. 14037.
—in which nucleus is an ear of wheat. 14260.3. A 7.
Concretions
—from elbow-joint. 14805. A 15.
—from sole of foot. 14810. A 15.
Hepatic calculus. 14167. A 85.
Renal calculi. 14000; 14001; 14002.2; 14260.2; 14261. A 27; A 53; A 192.
Intestinal calculi
—14260.5. A 37.
—in which nucleus is a fragment of iron. 14706.
Salivary calculus. 14500.05. A 192.
Urethral. 14001.3; 14004; 14262; 14339; 14340. A 37.
—in which predominating ingredients are
—phosphate of lime. 14175. A 15.
—uric acid. 14005. A 15.
—urate of ammonia and oxalate of lime. 14100. A 15.
—in which nucleus is a clot of blood; oxalate of lime. 14265.
Urethro-vesical calculi
—in which predominating ingredients are
—phosphate of ammonia and magnesia and carbonate of lime. 14223.
—with pin as a nucleus. 14268.
—urate of ammonia; fusible. 14113. A 15.
Uterine calculi. 14696. A 27.
Vesical calculi
—in which ingredients are not specified. 14007; 14186; 14187; 14188; 14242; 14249; 14253; 14257; 14260.6; 14260.7; 14263; 14315; 14323; 14324; 14326; 14336 (M); 14337 (M); 14338; 14341.5 (M); 14342; 14343; 14343.1; 14344; 14345; 14345.1. A 15; A 27; A 37; A 85; A 196; A 197; A 198; A 199.
—fusible. 14200; 14203; 14204; 14205; 14213; 14208; 14209; 14219; 14222; 14229. A 15.
—containing
—carbonate of lime; nucleus a pin. 14270; nucleus a spongy substance. 14272
—cystine. 14251.
—phosphate of ammonia and magnesia, urate of ammonia and urate of soda. 14234.
—phosphate of lime and urate of ammonia. 14224; 14225; 14226.
—urate of ammonia. 14201; 14206; 14227; 14231; 14232. A 15.
—and carbonate of lime with pebble as a nucleus. 14271. A 15.
—urate of magnesia. 14264.
—in which predominating ingredients are
—carbonate of lime. 14260.
—cystine. 14250.
—oxalate of lime. 14119; 14120; 14244; 14248; 14341. A 15; A 37; A 85.
—with clot of blood as a nucleus. 14273. A 27.
—fusible. 14155 through to 14163. A 15.
—and phosphate of ammonia and magnesia. 14154; 14152. A 15.
—and phosphate and carbonate of lime. 14240.
—and phosphate of lime. 14130 through to 14133; 14141. A 15.
—fusible. 14150; 14151. A 15.
—and uric acid. 14125. A 15.
—phosphate. 14279. A 195.
—phosphate of lime. 14170; 14171; 14174; 14189. A 15.
—and phosphate of ammonia and magnesia; nucleus a part of sponge. 14269.
—fusible. 14182; 14183; 14184. A 15.
—and urate of ammonia. 14192; 14191.
—with stone as a nucleus. 14266; a pebble. 14267.

—urate of ammonia. 14083 through to 14087. A 15.
—fusible. 14108 through to 14112; 14114; 14115. A 15.
—and phosphate of ammonia and magnesia. 14107. A 15.
—and oxalate of lime. 14098; 14099. A 15.
—fusible. 14102; 14103; 14104; 14116. A 15.
—and phosphate of lime. 14105. A 15.
—fusible. 14016; 14117; 14118. A 15.
—and uric acid. 14090; 14091; 14092. A 15.
—fusible. 14095. A 15.
—urate of soda. 14080; 14081. A 15.
—uric acid. 14002; cut by Dr. Physick from the bladder of Chief Justice Marshall. 14003; 14006; 14008 through to 14026; 14032; 14033; 14035; 14258; 14259. A 15; A 193.
—fusible. 14070 through to 14075. A 15; A 63.
—and urate of ammonia.
—fusible. 14046.
—and phosphate of lime. 14045.
—and oxalate of lime. 14050; 14052. A 15.
—fusible. 14060. A 15.
—and phosphate of lime. 14241. A 85.
—nucleus of which is
—ear of wheat. 14313. A 7.
—glass and rubber tube. 14311. A 141.
—iron shell. 14312.

PART VI

FOREIGN BODIES (see also nuclei of calculi)

Collection of Foreign Bodies removed from lungs and bronchus, with albums of x-ray pictures illustrating many of the cases. This collection was made by Dr. Chevalier Jackson and consists of over 3000 specimens including ammunition, bones, buttons, coins and other metal discs, dental objects, endogenous objects, glass and other minerals, hardware, jewelry, meats and other foods, needles, nuts, seeds and other vegetable substances, pins, safety pins, surgical objects and toys. A 194.

Hinge removed from a child's throat. 13400.
Necklace removed from female bladder. 14310; 14310.1. A 195.
Needles and *pins* removed from different portions of the body of an hysterical female. 13410; 13410.1.
Pin removed from the bladder of a man by suprapubic lithotomy. 14314.05. A 192.

PART VII

INSTRUMENTS

A. Anal and Rectal Instruments

Bistoury. 17826.08.
Bougies
—rectal; hard rubber. 17560.01; 17560.26; galvanic. 17560. A 22; A 202.
Clamps
—Amussat's haemorrhoidal. 17835.82.
—pile
—Kelsey's. 17110.22.
—Smith's. 17825.54.
Dilator
—anal. 17390.51; 17403; 17390.52.
—and speculum; Demarquay's. 17835.62. A 212.
—rectal; Todd's. 17405.00. A 53.
Fistulatome. 17823.88; 17823.89.
Forceps
—pile. 17825.58; 17825.60; 17825.62.
Gorget: rectal. 17825.02. A 146.
Specula
—anal
—with stylet. 17393.
—bivalve. 17393.02.
—rectal. 17836.23; 17390.14; 17832.28. A 201; A 210
—trivalve. 17392.30.
—Pratt's. 17836.24. A 201.
Syringe: rectal. 17832.20; 17830.91; 17830.92. A 210; A 243.
Thermometer; rectal. 17050.12.

B. Anesthetic Apparatus

Chloroform frame. 17110.50.
Inhaler. 17103.21; 17110.60.
—and accessories. 17103.18.
—Allis' chloroform inhaler. 17120.06; 17120.07.
—E. J. Coxe's. 17103.20.
—Fowler's (modification of Allis'). 17120.08.
Spray tube for ethyl chloride for local and general anesthesia. 1051, CCC. A 213.

C. Antiseptic Apparatus

Antiseptic spray
—Heuel's. 17103.05.
—carbolic, used by Lord Lister. 17103.16. A 53.
—replica. 17832.74.

D. Aural Instruments and Acoustic Appliances

Aids to hearing
—Acousticon (1936). 17831.84. A 216.
—Artificial hand (elliptical reflector-1900). 17831.67. A 216.
—Aurolese phone. 17831.66. A 216.
—bone conduction receiver (1920). 17831.71. A 216.
—Crystal phone (1930). 17831.80. A 216.
—ear trumpet. 17834.32. A 216.
—English carbon hearing aid (1920). 17831.72. A 216.
—experimental model of wood. 17831.82; 17831.85.
—French hearing aid. 17831.78. A 216.
—Globe phone (1910). 17831.69. A 216.
—Hearite carbon hearing aid (1930). 17831.79. A 216.
—Invisiphone (French—1931). 17831.81. A 216.
—London hearing dome (1900). 17831.68. A 216.
—midget receiver (1926). 17831.88. A 216.
—individual ear molds for retaining midget receiver. 17831.86. A 216.
—Phonophor (German 1923). 17831.73. A 216.
—speaking tube. 17831.65. A 216.
—Siemen-Halske miniature ear receiver (1920). 17831.76. A 216.
—Starper's Oriphone (1910). 17831.70. A 216.
—Straudiphone. 17831.92. A 216.
—Super-ear (1925). 17831.74. A 216.
—vacuum tube amplifier (1938). 17831.83. A 216.

Applicators. 17835.46. A 212.
Audiometer; Guttman's (1921). 17834.30. A 216.
Aural instruments, after Politzer. 17835.27. A 212.
Catheter; eustachian. 17835.47; 17835.48. A 212.
Cotton carrier. 17835.85.
Curette and hook. 17831.45. A 137.
Ear drum
—false. 17831.87. A 216.
—Toynbee's, of rubber. 17834.22. A 216.

Forceps
—Politzer's aural. 17836.28. A 201.
—Toynbee's angular ear. 17821.14.
—Wilde's. 17821.12.

Gouge, for mastoid operation. 17835.44. A 212
Lancet. 17835.70. A 212.
Otoscope
—Brunton's (1868). 17395.12.
—self-illuminating (1872). 17395.10.
—Burnett's (modified Siegle's). 17390.28.
—Clark's. 17831.20; 17390.24.
—Siegle's. 17395.14.

Probes. 17835.45. A 212.
Raspatory for mastoid operation. 17835.43; 17833.22; 17110.34; 17110.36; 17110.38; 17110.40; 17110.42. A 212.
Snare; Blake's. 17835.42. A 212.
Specula
—Erhardt's. 17395.06.
—Gruber's. 17390.31; 17395.08.
—Kramer's. 17834.23. A 11.
—Toynbee's. 17390.29.
—Turner's. 17395.04.
—Wilde's. 17390.30; 17395.02; 17395.09.

Spout; Hosmer's. 17824.40.
Syringe. 17832.21; 17090.63; 17832.10; 17090.74; 17832.19. A 210.
Tuning fork; Hartman's. 17008.00.
Dr. Douglas Macfarlan's instrument for training the deaf child. 17831.77. A 216.
Dr. Parrel's noise-maker for treating the deaf (1924). 17831.75. A 216.

E. Cupping, Phlebotomy and Leeching Instruments

Cupping sets. 17831.15; 17133.12; 17133.10; 17835.71; 17291.10; 998, CCC. A 257; A 258; A 81.
—and scarifying instruments. 17131.16; 17131.18. A 137.
Cupping glasses. 17133.00.
—Martin's (1794–1872). 923, CCC. A 203.
Lancets
—fleam (veterinary bleeding lancet). 17831.29.
—spring. 17834.33; 17130.52; 17310.54; 17130.56; 17130.58; 17130.60; 17130.62; 17130.64; 17830.68; 17830.67; 17130.51; 17130.50; 17836.33; 17835.11; 17835.12; 928, CCC; 941, CCC; 942, CCC. A 8; A 201; A 204; A 195; A 260; A 275; A 259.
—thumb. 17824.38; 17824.50; 17824.22 to 17824.36; 17824.44; 17824.48, 943, CCC;

944, CCC; 945, CCC; 946, CCC. A 8; A 123; A 276.
—and bistoury. 17833.61. A 11.
Artificial leeches
—Heurteloup's. 1033, CCC; 17130.48. A 87; A 212.
—Thomas'. 17133.50.
Scarificators
—automatic. 17131.00; 17131.02; 17131.04; 17131.06; 17131.08; 17131.10; 17131.12, 17131.14; 17834.88; 17836.36; 17835.13. A 201; A 204; A 261.
—Baunscheidt's. 17835.83. A 137.
—Buttle's. 17131.01.
Vaccination set. 17090.31; 17090.33; 17090.35; 17090.29; 17090.27; 17834.71. A 49; A 264; A 220.
—lancet. 17833.03. A 37.

F. Dental Instruments

Elevator. 17832.01. A 216.
Extraction instruments. 17179.44; 17179.42.
—ancient. 17836.38. A 201.
Forceps
—17833.21; 17831.17; 17831.18.
Form for cutting teeth. 17560.03.
Gum lancet. 17833.60; 17824.46. A 11.
Orthodontic appliance for raising the bite or splinting the jaw. 17830.31. A 240.
Saw. 17176.20.
Scraper for bones and teeth. 17821.08.
Instruments used by ship surgeon about 1818. 17179.84. A 8.
Instruments. 17290.74.

G. Diagnostic Instruments

Centrifuges. 17830.77; 17830.78. A 243.
Haemoglobinometer
—Fleischl's. 17834.69; 17834.70. A 115; A 270.
Haemometer. 17832.79. A 11.
Hour glass used for taking pulse. 17834.96. A 233.
Percussion hammers. 17015; 17015.05; 17015.15; 17833.08; 17836.10; 17836.01; A 137; A 235; A 37; A 201; A 234.
—Babinski's. 902, CCC; 903, CCC. A 244.
—Wintrich, Skoda's model. 17015.10. A 137.
Phonendoscope. 17836.09. A 201.
Pleximeter. 17836.00; 17017.00; 17017.01. A 234; A 235.
Polygraph
—MacKenzie's. 17120.05. A 203.
Sphygmographs
—Dudgeon's (1890). 17834.73. A 281.
—Jacquet's (1890). 17827.07.
—Marey's (1857). 17830.88. A 243.
—Pond's. 17020.70.
—Richardson's (1900–1910). 17833.51. A 216.
—Uskoff's (1897–1901). 17827.09.
Sphygmomanometer
—17830.32; 17830.311.
—Faught's. 17830.75. A 243.
Spirometer. 17290.43.
Stethoscopes. 17020.42; 17020.00; 17835.40; 17830.90; 981, CCC. A 212; A 240; A 245.
—Alison's
—binaural, with two chest pieces. 17836.06. A 201.
—differential. 17020.66. A 137.
—aluminum. 17832.55. A 11.
—Arnold's (1832). 17020.56.
—binaural, used about 1900. 17020.53; 17836.07; 17020.60. A 137; A 201.
—Camman's original. 17020.64. A 137.
—cardiac. 17020.72. A 137.
—Koenig's. 17020.74. A 137.
—DaCosta's. 17836.02. A 234.
—Dennison's binaural. 17836.08. A 201.
—flexible (1832). 17020.54; 17020.55. A 137.
—French model (old) with pleximeter attached. 17020.24. A 137.
—Hawksley's. 17020.49; 17020.51; 17020.45; 17020.46. A 235.
—ivory, with pleximeter and percussor, manufactured in Japan. 949, CCC.
—Kerr's Symballeophone. 17832.481.
—Leaman's intensifying double (1890). 17020.62. A 137.
—monaural
—of wood. 17020.16; 17020.14; 17020.18; 17020.20; 17020.12; 17020.30; 17020.10; 17020.225; 17020.34; 17020.36; 935, CCC. A 209; A 236; A 137; A 40; A 241
—Laennec type. 17020.02; 17020.52; 17020.04; about 1840. 17020.08; 17020.32; from original model. 938, CCC. A 236; A 237; A 115; A 137.
—and ivory. 17020.06; 17020.28; 17020.26; 17020.22; 17020.40; 950, CCC; A 238; A 115.
—with pleximeter. 17020.38. A 236.
—with clinical thermometer in cylinder. 17830.89. A 239.

LIBRARY OF THE
COLLEGE OF PHYSICIANS
OF PHILADELPHIA

Stethoscopes
—monaural
—of metal, with pleximeter. 17020.44. A 137.
—Pinard's aluminum. 17832.55. A 11.
—Quain's. 17020.48.
—Snofton's binaural. 17020.58.
—Stokes'. 17020.50. A 137.
—used to detect submarines in World War I. 17395.16; 17020.80.
Tambour. 17832.96. A 108.
Thermometers
—clinical. 17831.40; 17830.84; 17050.09; 17830.83; (1885). 17050.18. A 253.
—Civil War Period (1860–1865). 17050.00; 17050.02; 17050.04; 17050.06.
—Cullen. 930, CCC; 951, CCC.
—French manufacture (1850–1860). 17050.08. A 284.
—made in London (1879). 17050.16. A 247.
—non-registering (1869). 17050.10. A 253.
—and urinometer (1864). 17050.14. A 171.

II. General Purpose Instruments and Apparatus

Adhesive tape
—original brought from Edinburgh in 1886. 17830.85. A 243.
Air pump. 17827.05; 17832.45.
Alcoholometer. 17831.39.
Apparatus for producing *hypnosis;* Luys' revolving mirrors. 17827.15. A 273.
Aspirators. 17100; 17100.40; 17100.30.
—Dieulafoy's. 17100.10.
—electrical. 17827.38.
—Potain's. 17100.20.
—with stop-cock. 17100.50.
Bandage winders. 17827.01; 17832.46; 17830.86. A 243.
Bottle dropper. 17103.19.
Candle holder. 17834.31. A 259.
Candle lamp; Priestley Smith's. 17835.28. A 212.
Cannula. 17102.01.
Caustic sticks. 17131.03.
Electrical apparatus. 17827.32; 17291.01. A 146.
—chloride of silver dry cell battery. 17827.34.
—frictional. 17832.44.
—galvanic battery set. 17830.87; 17827.35; 17827.24. A 243.
—magneto-electric. 17827.26.
—for mental diseases (1854). 17827.36.
—plate used in electrophoresis. 17834.34. A 259.
—Mme. Marie Curie's original *quartz-piezo electrometer.* 976, CCC. A 300.
First aid packet, relic from Spanish American War. 16020.00. A 269.
Gas lamp. 17110.62.
Instruments from carved horn used by Japanese women. 17827.13. A 253.
Medicine bag for general practice. 17827.11, 1084, CCC. A 268; A 69.
Medicine case. 16017.00; 931, CCC; 947, CCC. A 289; A 49.
—portable. 16004.00. A 235.
—in use since 1790. 16001. A 105.
—once belonging to Dr. Benjamin Rush. 16003.00.
—of Chinese medicine; drugs and type of containers unchanged over a period of 1500 years. 16018. A 53.
Medicine chest. 16019.00; 1057, CCC. A 277; A 293.
—carried by Elisha Kent Kane on second Grinnell Expedition (1853–1855), in search of Sir John Franklin. 16500.08. A 278.
Medicine spoon (1890). 17834.26; 1000, CCC. A 34; A 279.
Medicine man's stick. 17827.19.
Mortar and pestle. 17560.07; 901, CCC. A 255; A 8.
Muscle beater. 16500; 16500.02; 16500.04; 16500.06. A 137.
Necropsy set. 971 CCC. A 280.
Perkins' tractors. 929, CCC. A 8.
Sand glass timer. 17830.02.
Scales; apothecaries'. 17832.78; 16010.01; 17834.24; 16010.02. A 24; A 265.
—used from 1796 to 1873. 17835.00. A 254.
—in use about 1810. 16010.
—Fitch's (1885). 16010.05. A 266.
Soldiers' Sanitor. 16015.00.
Syringes
—hypodermic. 17090.12; 17090.30; 17090.28; 17090.32; 17090.34; 17090.36; 17090.38; 17090.40; 1709042; 17832.23. A 210; A 220.
—Pravaz model of ivory and glass (1853). 17090.10.
—of metal, gold plated. 17090.14.
—one of the first made by Gemrig in Philadelphia, 1857. 17090.06.
—one of the first six made in the U.S.A.

by Tiemann & Co., using a Ferguson syringe as a model. 17090.08.
—very old model. 17090.41. A 137.
—the real progenitor of the present hypodermic instrument. 17090.02.
—French manufacture
—with unpointed needles. 17090.04.
—purchased about 1872. 17090.16.
—from Vienna (1880). 17090.18.
—American manufacture (1890–1900); 17090.24; 17090.26; 17090.20; 17090.22.
—for large doses of antitoxin. 17835 61. A 212.
—devised by Laparque; a needle trocar with leather piston. 17090.00.
—Luer's all glass antitoxin. 17835.68; 17835.69. A 212.
—Wyeth's small glass. 17835.60. A 212.
—irrigating. 17291.03; 17832.76; 17832.77; 17831.13; 17090.78; 17090.82; 17090.80; 17090.50; 17090.84; 17090.48; 17090.68; 17090.66. A 243; A 263; A 288.
—Equisier's. 17103.22.
—Davidson's (1866). 1709.64; 17090.44.
—glass. 17090.85.
—hard rubber. 17090.70; 17090.72; 17090.62.
—pewter. 17834.57; 17090.90; 17090.61; 17834.89. A 261.
—antique. 17090.86; 17090.88; 17090.87. A 262.
—veterinary. 17834.56. A 261.
—used in 1867. 17090.46.

Trocars. 17102.00; 17102.02; 17102.04; 17102.09; 17102.10; 17102.11; 17102.13; 17102.15.
—and cannulae. 17102.06; 17102.20; 17102.22; 17102.24; 17102.50.

Water coil. 17120.02; 17120.04. A 220.
—early type of hot water bottle. 17120.00. A 220.

Weights; apothecaries'. 16011.00; 16002; 17835.14. A 165; A 204.

X-ray tubes. 1052, CCC; 1053, CCC; 1054, CCC; 1055, CCC; (1895). 1060, CCC; (1897). 1061, CCC; (1899). 1062, CCC; (1902). 1063, CCC; (1901). 1064, CCC. A 292; A 295.

I. General Surgical Instruments and Appliances

Adjuster
—Jarvis' (1867). 17560.02.
—Kellogg's. 17823.86.

Amputation instruments
—knives. 17823.035. A 194.
—catlin. 17826.00; 17826.02; 17826.04; 17826.06.
—set. 17823.85; 1070, CCC; 17835.73; 17835.74; 17823.80; 17823.79; 17823.94; 17827.22. A 87; A 252.

Angiotribes
—17835.93; 17835.94; 17835.95. A 204.

Apparatus
—Levis', for dislocation of fingers. 17833.07. A 37.
—for active or passive flexion and extention of fingers, wrist and elbow, designed by Dr. John H. Arnett. 17830.34. A 301.

Applicators
—17830.65; 17830.63.
—Fitch's. 17832.40. A 210.
—original radium, used by Dr. Abbe. 980.09 CCC. 980.07, CCC. A 272.

Bistouries
—curved. 17828.04; 17828.06; 17828.08.
—straight. 17828.02.

Bone instruments
—17823.87.
—chisel for opening the skull. 17826.16. A 53.
—periosteum elevator. 17833.23.
—exfoliator from time of Ambroise Paré (1550–1560). 17179.40; 17179.60. A 211.
—forceps
—for ankylosis of the jaw. 17821.20.
—bone cutting. 17831.64; 17178.10.
—Liston's angular. 17178.12; straight. 17178.02.
—Velpeau's. 17178.14.
—bone gouging
—Luer's straight. 17178.20.
—rongeur. 17831.28.
—bone holding
—Ferguson's lion jawed. 17178.40.
—bone nippers
—Liston's. 17178.00.
—Luer's. 17178.04.
—sequestrum. 17178.60.
—lenticular knives. 17110.30; 17110.32; 17110.44.
—rachitome. 17176.71.
—saws. 17176.61; 17176.70. A 211.
—amputation. 17176.54. A 211.
—Rust's. 17176.52. A 211.
—Adam's subcutaneous. 17176.00.
—chain. 17176.30.

Bone instruments
—saws
—Hays'. 17176.10.
—Martin's (1872). 17176.60.
—metacarpal
—Langenbach's. 17176.02; 17176.04.
—Saterlee's. 17176.40.
—Saterlee's. 17176.50.
—scoops or curettes. 17826.18; 17826.20; 17826.22; 17826.24; 17826.26; 17826.28; 17826.30; 17826.32; 17826.34; 17826.36; 17826.38. A 146.
—scraper. 17831.55. A 137.
—screw for uniting fractures. 17174.50. A 211.
—trephines. 17179.26; 17179.27; 17179.25; 17833.05; 17833.06; 17179.85; 17823.83; 17823.82; 1069, CCC. A 37; A 87.
—from time of Ambroise Paré. 17179.35. A 211.
—and bone exfoliator used about the time of Ambroise Paré. 17179.30. A 211.
—and other bone instruments. 17823.90.
—Stellwagon's. 17823.92.
Caustic carriers
—17835.86; 17831.47; 17832.95. A 137.
Cauteries
—electric. 17831.19.
—irons. 17110.04; 17110.00; 17110.02; 17110.16; 17110.12; 17110.13; 17110.14; 17110.18; 17110.20; 17833.02. A 171; A 37.
—Paquelin's. 17823.95; 17823.93.
—thermo. 17110.55.
Clamps
—artery. 17833.96; 17179.82. A 11.
—hemostatic. 17829.31.
Curette and director. 17825.06; 17825.08.
Director; grooved. 17825.72; 17825.93; 17825.95.
Dissecting instruments
—1015, CCC; 17827.44; 17827.48; 17827.41; 17827.40; 17834.25; 17827.00; 1085, CCC. A 87, A 171; A 265; A 49; A 87.
Ecraseur
—17460.30; 17460.35.
Forceps
—artery. 17836.29; 17821.45; 17829.13; 17829.15; 17829.17; 17829.19; 17829.41; 17821.26. A 201.
—Dieffenbach's curved. 17836.30. A 201.
—small. 17821.46.
—Kelly's. 17821.22.
—bone (see under bone instruments).
—bullet. 17821.24; 17836.32; 17825.56. A 201.
—dressing. 17834.94; 17829.00. A 233.
—general use. 17829.09; 17829.25; 17829.33; 17830.79. A 243.
—mouse-tooth. 17829.28.
—pin cutting. 17821.10.
—polypus. 17831.53. A 137.
—Sims'. 17829.07.
—splinter. 17836.31. A 201.
—thumb. 17829.02; 17829.04; 17829.06.
—tissue. 17829.16; 17829.18; 17829.20; 17829.22; 17829.23; 17829.35; 17829.43.
—Senn's slide catch. 17829.24; 17829.26.
—torsion. 17836.57. A 201.
—hemostatic. 17829.11; 17829.39.
—mosquito. 17829.37.
—Thornton's "T" shaped. 17833.57; 17821.63; 17821.65; 17821.67; 17821.69. A 11.
Hook and spatula. 17830.64.
Knives
—section. 17179.86.
—surgical. 17826.07. A 69.
Knot-tier. 17835.99. A 204.
—Outerbridge's. 17835.97. A 204.
Myograph. 17291.08.
Necropsy set. 971, CCC. A 299.
Needles. 17822.43; 17822.33; 17822.121.
—aneurism. 17822.36; 17822.37; 17822.39; 17822.40; 17822.41; 17822.20; 17822.21; 17822.22; 17822.23; 17822.24; 17822.25. A 146.
—Deschamp's. 17831.51. A 137.
—perineum. 17832.37. A 210.
Needle holders. 17822.13; 17822.15; 17822.17; 17822.19; 17822.27; 17822.29; 17822.31; 17822.58; 17836.35. A 146; A 201.
—and forceps. 17831.54. A 137.
—and wire threader. 17832.91. A 37.
—Stevens'. 17822.56.
Needle threader. 17831.50. A 137.
Osteoplastic outfit. 17823.91.
Pocker cases
—17827.39; 17827.51; 17827.53; 17827.47; 17827.54; 16016; 17827.45; 17827.42; 17835.72; 17827.43; 17827.49; 17827.50; 17827.52; 17827.46; 17827.55; 17834.99; 936, CCC; 1016, CCC; 1086, CCC. A 49; A 165; A 254; A 274; A 87.
—of Dr. Abbe. 980.11, CCC. A 272.
Postmortem instruments. 17823.84.

Probes. 17825.28; 17823.77; 17834.93. A 49; A 146; A 233.
—Nelaton's bullet. 17823.76. A 53.
Rachitome. 17176.71.
Retractors. 17409.10; 17409.12; 17409.16; 17409.18.
Scalpel, 18th century. 985, CCC. A 34.
Scissors. 17829.54.
Splints for
—clavicle; adult. 17830.80; child's. 17830.81. A 243.
—maxilla; adult. 17830.82. A 243.
—leg. 17835.01; 17835.021; 17835.04; 17835.05; 17835.06; 17835.08; 17835.09; 17835.10.
—with foot rest. 17835.02.
—with knee support. 17835.03. A 85.
—pelvis. 17835.07.
Sponge holder. 17831.49. A 137.
Cases of surgical instruments
—17827.03; 17827.10; 17560.08; 17560.13; 17827.57; 17823.81; 17827.20; 17827.16; 17827.21; 17827.12; 17827.14, 17821.03; 927, CCC; 924, CCC; 1004, CCC. A 58; A 211; A 251; A 255; A 282; A 283; A 34.
—taken from German storehouse, 1917. 17830.33. A 287.
—used by Lord Lister. 976, CCC. A 294.
Sutures. 17826.12.
Tenacula
—dissecting. 17836.34. A 201.
—double. 17821.83. A 165.
—minor operating. 17821.86; 17821.47; 17821.49; 17821.51; 17821.53; 17821.55; 17821.57; 17821.85; 17821.87; 17821.59; 17821.61. A 146.
Tourniquets. 17831.37.
—French type. 17157.20.
—Petit's (1718). 17157.00; 17157.02; 17157.04.
—Signorni's (1871). 17157.10. A 236.
Towel holder. 17822.50.
Vein stripper, Mayo's. 17835.98. A 204.
Lead wires. 17823.03.
Wire twister. 17833.09. A 37.
—Simon's. 17831.27.

J. Gynecological

Calibrator
—Kelly's urethral. 17836.12; 17833.65. A 11; A 201.
Cannula
—Dr. Gooch's (1831) for passing ligature around uterine polypus. 17102.07. A 146.
Catheters
—female. 17823.742; 17823.235; 17831.36.
—Sims', sigmoid, for treating vaginal fistula. 17827.04.
—Skene-Goodman, self-retaining. 17823.35; 17823.36; 17823.37.
Cautery irons for use on pedicle in ovariotomy. 17110.06; 17110.08; 17110.10.
Clamp for cautery section of pedicle in ovariotomy. 17179.82.
Compressor
—Charrier's urethral, to stop the flow of urine during operation for fistula of vagina. 17830.601.
—pedicle. 17179.80.
Curettes (uterine). 17821.77; 17825.00; 17825.04. A 146.
—with blunt hook and forceps combined. 17836.43. A 201.
—Clark's rinsing. 17833.34. A 11.
—Collins'. 17825.07; 17825.09. A 146.
—Recamier's. 17825.15.
—Thomas' blunt. 17832.43. A 210.
—Siemon's. 17825.03; 17825.05. A 146.
—Sims' sharp. 17832.27. A 210.
Dilators (uterine)
—cervical, and bistoury. 17291.11. A 146.
—Atlee's. 17832.39. A 210.
—Bossi's for cervix. 17833.40. A 11.
—Ellenger's. 17406.06.
—Gau's for cervix. 17833.38; 17833.381. A 11.
—Goodell's. 17406.08.
—Molesworth's. 17835.59; 17834.90; 17401.00; 17401.02; 17401.04. A 212; A 213.
—improved, with syringe (1850). 17402. A 212.
—from time of Ambroise Paré; made in 1550. 17404.00. A 211.
—Wilson's. 17406.00; 17406.02; 17406.04. A 214.
—unidentified. 17406.10; 17833.92; 17833.39; 17832.32. A 11; A 210.
Döderlein tube; Nicholson's modification. 17833.44. A 11.
Douches (intra-uterine). 17823.34.
—Bozeman's. 17823.34 C.
—Frisch's. 17823.34 B.
—Kelly's. 17823.34 A.
—Hoffman's. 17833.33. A 11.
—nozzle of. 17833.32. A 11.

Ecraseurs (uterine). 17831.48. A 137.
—Koeberle's. 17490.00; 17490.02; 17490.04.
—Luer's. 17460.00; 17460.02; 17460.20.
—Smith's. 17460.10. A 53.
Forceps
—Emmet's uterine cutting. 17835.96. A 204.;
—dressing. 17391.14; 17393.06; 17393.04. 17835.88; 17829.09; 17829.25; 17829.33. A 146.
—Bozeman's, also for introducing tents. 17821.29.
—haemostatic. 17833.95. A 11.
—hysterectomy. 17821.31.
—Pean's. 17821.43; 17836.44. A 201.
—with Landau's jaw. 17821.39.
—with straight long jaw. 17821.37; 17821.35.
—needle. 17833.89. A 11.
—Nelaton's sac. 17829.01; 17829.03; 17829.05.
—pedicle clamp. 17179.54; 17179.50; 17821.33; 17821.41. A 53; A 146.
—Atlee's. 17179.46.
—Simpson's. 17179.48.
—Spencer Wells'. 17179.52; 17821.25; straight. 17821.23; 17821.17; curved. 17821.21; 17821.19.
—polypus. 17835.89. A 212.
—tenaculum. 17821.91; 17821.93; 17821.95; 17821.97; 17821.89; 17821.99; 17831.43; 17834.95. A 137; A 233.
—tumor. 17821.01; 17833.90. A 11.
—volsella. 17821.05; 17821.07; 17821.09; 17821.11; 17821.13; 17821.15. A 146.
—Durham's. 17821.28.
Hysterotome. 17831.32; 17821.73.
Ligature carriers. 17822 to 17822.12.
Needles
—pedicle; right and left. 17822.35; 17822.38; 17822.30. A 146.
—perineum
—Dickinson's. 17833.63; 17833.64. A 11.
—Hirst's, curved. 17833.62. A 11.
—straight. 17832.42. A 210.
Pessaries
—anteflexion; Gehrung's. 17520.44.
—anteversion
—Buttle's (vulcanite). 17520.60; 17520.46.
—Cutter's. 17520.78 B.
—Gehring's (vulcanite). 17520.70; 17520.00.
—Thomas'
—double bow. 17520.02; single bow. 17520.04; metal. 17521.18; vulcanite. 17521.50; 17520.68.
—ball
—of glass. 17521.60; of metal. 17521.62.
—of silver. 17520.22. A 64.
—and stem; metal. 17522.08; 17522.10; vulcanite. 17520.72; 17520.74; 17520.76.
—cradle; vulcanite. 17520.80.
—disc with hole in center; vulcanite. 17522.14.
—prolapsus
—Hoffman's. 17520.26. A 206.
—Thomas'. 17521.04.
—Zwank's. 17520.16; 17520.36. A 206.
—metal. 17522.06.
—retroflexion
—Thomas-Smith's. 17520.10.
—retroversion
—Emmet's. 17520.14.
—Fitch's. 17520.20; vulcanite. 17520.66. A 206.
—Fowler's. 17520.12.
—Gehrung-Smith. 17520.08.
—Hewitt's (vulcanite). 17520.96.
—Hodge's (vulcanite). 17520.88; 17520.86; 17520.50; 17520.32; 17520.48; horseshoe. 17520.34; original. 17520.24.
—Hurd's oval; vulcanite. 17521.26.
—Smith's (vulcanite). 17520.84; 17520.06; 17520.92.
—Thomas-Cutter's. 17520.78 A.
—vulcanite; oval. 17521.06.
—ring. Hewitt's (vulcanite). 17520.82.
—glass. 17521.58.
—rubber. 17291.02; 17522.12; removed from a patient after eight years. 17520.30. A 88.
—stem
—Chamber's (metal). 17521.74. A 146.
—Conant's intra-uterine (vulcanite). 17520.38.
—Engham's (metal). 17521.72; 17521.86. A 207.
—Jackson's (vulcanite). 17520.18.
—Meadow's (vulcanite). 17520.62; intra-uterine glass. 17521.70. A 207.
—metal. 17521.78; 17521.82; 17521.84; 17521.88; 17520.94.
—Van De Warker's intra-uterine vulcanite. 17521.76. A 208.
—vulcanite. 17521.80.
—of glass. 17521.56; 17521.54; 17521.52.
—of metal. 17520.42; 17521.08; 17521.10;

17521.12; 17521.14; 17521.16; 17521.20; 17521.22; 17521.24; 17521.46; 17521.44; 17521.42; 17521.64; 17521.66; v-shaped. 17521.32; 17521.34; 17521.36; 17521.38; 17521.40; soft. 17521.30.

—wooden. 17520.64.

—vulcanite. 17521.28; 17520.52; 17520.54; 17520.56; v-shaped. 17520.40; bow. 17520.90; oval. 17520.48; 17520.58; 17520.98; 17521; 17521.02.

Pins

—hysterectomy; Koeberle's. 17560.06. A 53.

Probes

—uterine. 17836.18; 17825.29; 17825.32; 17825.20; 17825.21. A 201; A 146.

Repositors (uterine)

—Emmet's. 17832.25. A 210.

—Gardener's. 17832.24; 17409.00; 17409.02; 17409.04. A 146; A 210; A 215.

—White's. 17520.28.

Retractors

—abdominal; Deaver's. 17409.14; 17290.58.

—vaginal. 17409.20. A 146.

—wooden. 967, CCC. A 206.

—and for hysterectomy; Robb's. 17409.06; 17409.08.

Saw

—Thomas' spoon. 17825.01.

Scarificator

—Buttle's spear-pointed. 17832.41. A 210.

Scissors (*uterine*)

—Bozeman's. 17829.32. A 146.

—Emmet's full curved. 17829.44; 17829.30; 17179.62; 17179.64; angular. 17179.66. A 146.

—Kelly's. 17829.40. A 146.

—Siebold's. 17829.36.

—Sims' angular. 17829.52.

—unidentified. 17829.42; 17820.34; 17829.38; 17829.50; 17820.48. A 146.

Specula, vaginal dilating

—Burrage's for intra-uterine tamponade. 17395.00.

—Cusco's. 17390.37; bivalve, used about 1877. 17392.20; 17392.22.

—Dawson's. 17831.63. A 146.

—Ferguson's; tubular. 17390; 17390.01; 17390.02; glass. 17390.19; 17390.21; bivalve. 17390.03. A 137.

—Goodell's. 17392.18; 17390.35; bivalve. 17392.10; duck bill. 17390.34; 17390.36. A 64.

—Graves'. 17836.45. A 201.

—Nott's. 17836.47; trivalve. 17392.28. A 201.

—Ricord's. 17836.46; bivalve. 17390.05; 17390.07; 17392.02; 17392. A 137; A 201; A 171.

—Sims'; univalve. 17391.08; 17391.10; 17391.12; 17836.48; 17390.32; 17390.33. A 201.

—Simpson's trivalve. 17392.26; 17392.24.

—Smith's bivalve. 17392.12; early model. 17831.60; later model. 17831.61. A 137.

—and vectis. 17820.84.

—unidentified

—bivalve. 17392.06; 17392.14; 17392.16; 17831.62; 17392.23; 17392.04; 17392.07; 17392.08; 17392.32; 17392.34. A 171; A 137; A 146; A 209.

—trivalve. 17392.31.

—tubular. 17390.22; 17390.12; 17390.04; 17390.09; 17390.11; 17390.13; 17390.16; used about 1860–1870. 17390.18. A 53.

—glass. 17390.50; 17390.53; 17390.54; 17831.59. A 98; A 137.

—metal. 17390.06; 17390.08; 17390.10; 17390.15; 17390.17.

—hard rubber. 17390.23; 17390.25; 17390.27.

—univalve. 17391.04; 17391.06; 17391.16; wooden. 17391; 17391.02.

Sounds (uterine)

—Simpson's. 17823.19; 17825.30. A 146.

Sponge holder (uterine)

—Husson's (1899). 17822.52. A 212.

Syringe; vaginal. 17835.87. A 201.

—intra-uterine. 17090.76.

Tampon expeller; Thomas'. 17836.37. A 201.

Tenaculum

—Emmet's uterine. 17408.02.

—double. 17408.00. A 146.

—and replacer

—Kelly's. 17821.75; 17821.71.

—two pronged. 17821.79.

three pronged. 17821.81.

Tents

—sea-tangle. 17400.

Trachelorrhaphy set. 17291.09.

Tractor. 17179.58.

Trocar used in ovariotomy. 17102.32; 17102.30. A 7.

Wire adjuster; Sims'. 17560.04.

K. Instruments Used for Intestinal and Hernia Operations

Bistoury for hernia. 17831.35.
Buttons, Murphy. 17823.78. A 53.
Directors. 17825.75; 17825.99.
—double hernia. 17825.79.
Knives; hernia. 17826.10.
Pump
—stomach. 17291.07; 17103.26; 17103.30. A 165; A 220.
—Weiss. (1832). 17103.28; 17103.32.
Trocar
—abdominal. 17831.26; 17836.53. A 201.
—and cannula. 17102.40.

L. Maternity Instruments

Breast pump. 17291.05; 17291.04; 17103.34.
Top to feeding bottle. 1073, CCC. A 296.
Pap dish. 999, CCC; 1010, CCC. A 297; A 298.
Metal nipple. 1072, CCC. A 296.
Kent's metallic shield and caoutchoue teat; a mechanical substitute for excoriated and retracted nipple (1883). 17120.10.

M. Microscopes and Accessories

Condenser. 17647.34.
Forceps
—cover glass
—Cornet's. 17836.54. A 201.
—Kuehn's. 17836.55. A 201.
Life slide; Holman's. 17834.35. A 259.
Microscopes
—R. J. Beck. 17832.81. A 227.
—binocular. 17647.32.
—class. 17647.38.
—compound. 17647.22.
—Holmes' with oil as illuminator. 17000.
—Edwin Opie's (1876). 1006, CCC. A 170.
—Queen's. 17647.40; 17647.325.
—Van Leewenhoek's; facsimile of microscopes in possession of the University of Utrecht. 970, CCC. A 228.
—Weiss. 17834.27. A 226.
—Carl Zeiss (1883). 973, CCC. A 230.
—Zentmayer. 1021, CCC. A 212.
—American student. 975, CCC; 974, CCC.
—with accessories. 1021, CCC. A 212.
—unidentified. 17832.89; 17647.28; 17647.30; 1067, CCC. A 229.
—and accessories. 17647.26; 17647.24; 973, CCC; 974, CCC; 975, CCC. A 230
Microscopic knife; triangular. 17836.56. A 201.
Microtome. 17827.58; 17830.69; 17826.42. A 53.
Trowel for lifting sections for microscopic study. 17830.90. A 212.
Turn-table. 17831.41.

N. Nose and Throat Instruments

Applicators
—laryngeal. 17835.36; 17835.56. A 212.
—nasal; Buck's. 17835.55. A 212.
Atomizers
—17103.12; 17103.14. A 37.
—steam. 17832.10. A 216.
—Cedman and Shurtleff's. 17103.00; 17103.02; 17103.04; 17103.10. A 137.
—an original. 17103.08. A 137.
—Siegle's. 17103.06; 17103.07. A 137.
—Esmarch's cut-off. 17824.42.
Brushes
—laryngeal. 17290.70; 17835.39. A 137. A 212.
Cameras
—for laryngeal photography. 17290.45; 17290.39. A 22; A 242.
Cannulae
—nasal. 17290.61.
—Bellocq's. 17102.035; 17102.03; 17102.05.
—tracheal. 17830.20; 17830.21. A 240.
—Durham's. 17830.24; 17830.25. A 240.
—Luer's. 17836.19. A 212.
Cautery
—for larynx (electric). 17830.04; 17830.13; 17830.06. A 240.
—and snare. 17831.19; 17830.05; 17830.02; 17830.03; 17830.14. A 240.
—and snare; Fraenkel's nasal. 17831.99. A 216.
Chisel
—for Ferguson's operation for cleft of hard palate. 17290.48; 17833.04. A 37.
Compressor
—for nose. 17290.72. A 137.
Curettes
—Gottstein's adenoid. 17835.41. A 212.
—laryngeal. 17290.15; 17290.17; 17290.19.
Depressors
—tongue. 17835.81; 17290.571; 17290.60; 17290.56; 17830.10; 17830.11; 17830.19; 17290.57. A 212; A 240.
—Bosworth's. 17290.52; 17290.54.
—double. 17290.63.
—Lentz. 17290.62; 17290.64.

—Turc's. 17835.23. A 212.
—and cheek retractor. 17836.22. A 201.

Dilators
—laryngeal. 17830.07; 17830.08. A 240.
—for expanding tracheotomy incisions. 17830.22. A 240.

Ecraseur
—for nasal polypus. 17460.42; 17460.40. A 7.

Forceps
—esophageal. 17829.08; 17829.10; 17829.12; 17829.14. A 146.
—laryngeal. 17290.11; 17290.13; 17290.59.
—Cusco's. 17290.05; 17290.07.
—Fraenkel's. 17290.57.
—Mackenzie's. 17290.09; 17290.53; 17290.55.
—nasal
—Berens' dressing. 17835.66. A 212.
—Cohen's post nasal cutting. 17835.42; 17290.51.
—polypus. 17290.49.
—Gross'. 17832.33. A 210.
—post nasal. 17835.53. A 212.
—seizing
—Esmarch's. 17835.64. A 212.
—tonsil. 17835.38; 17824.01; 17824.03. A 212.
—Whitehead's. 17831.44. A 137.

Gag
—mouth. 17835.25; 17830.16; 17830.17. A 212; A 240.
—Denhardt's. 17836.20. A 212.
—Heister's. 17835.24. A 212.

Gas masks used in World War I
—British. 17830.96; 17830.97. A 55.
—French. 17830.93. A 79.
—German. 17830.94; 17830.95. A 55.

Guard
—finger. 17830.09. A 240.
—Lennox Browne's. 17835.34. A 212.

Head band
—Sardy's. 17560.10.
—Worrall's. 17560.11.

Hemostat
—tonsil. 17835.26. A 212.

Inhaler
—Mackenzie's eclectic. 17834.74.
—Dr. H. R. Oliver's hand instrument (1866). 17103.24.
—Walton's oxygen. 17120.09. A 137.

Insufflators. 17103.23.
—Cohen's. 17830.76. A 243.
—Lucae's. 17835.35. A 212.

Knives
—cautery. 17830.01. A 240.
—laryngeal. 17290.34. A 137.

Lamp
—Collins'; laryngeal. 17647.36.
—electric for tracheal examinations. 17830.28. A 240.

Laryngological instruments; sets. 17290.41; 17290.37; 17290.47. A 22; A 171.

Laryngoscope. 17290.38; 17290.35; 17290.36; 17290.40; 17290.42; 17290.46. A 137.

Mirror
—laryngeal. 17830.12; 17290.66; 17290.67; 17835.29; 17290.65. A 53; A 194; A 240.
—Michel's. 17835.33. A 212.
—tracheal. 17830.29. A 240.

Packer
—nasal. 17835.57. A 212.

Pharyngoscope
—Moura-Bournillou's. 17827.02; 17830.18. A 137; A 240.

Polypus instruments
—Schroetter's. 17835.67. A 212.
—Stoerck's. 17835.63. A 212.

Probang. 17836.21. A 212.

Respirators. 17110.51; 17110.52; 17110.53.

Retractors
—cheek, used in operation on President Cleveland in 1893. 17409.22. A 53.
—palate. 17830.30; 17830.23; 17830.15. A 240.

Saws
—nasal. 17835.58. A 212.
—Sajou's angular. 17836.51. A 212.
—straight. 17836.50. A 212.

Scissors
—tonsil. 17835.31; 17835.32. A 212.
—uvula; Wood's. 17835.30. A 212.

Septometer
—Seiler's. 17836.49. A 212.

Snares
—nasal
—Bosworth's. 17835.51. A 212.
—Jarvis'. 17835.50. A 212.
—tonsil
—Eves'. 17834.29. A 216.
—Lewis'. 17834.28. A 216.
—O'Dwyer's. 17290.21; 17290.23; 17290.25 17290.27.

Specula
—nasal. 17832.29; 17396.00; 17831.57. A 137; A 210.
—Bosworth's. 17835.54. A 212.

Specula
—nasal
—Fraenkel's. 17832.30. A 210.
—Hartman's. 17390.26.
—for mouth
—Charrière (1877). 17394.02.
—Paré (1550–1560). 17394.00.
Sponge
—laryngeal. 17835.39. A 212.
Sponge-holder
—laryngeal. 17822.54.
Splint
—for nose. 17830.60.
Syringe
—nasal. 17103.23; 17832.22; 17832.18. A 210.
—post nasal. 17836.52; 17290.551. A 212.
Tenaculum
—tonsil. 17835.37. A 212.
Tonsillectomy set. 17290.75.
Tonsillotomes. 17831.56; 17824.08; 17824.00; 17824.02; 17824.04; 17824.06. A 137; A 217.
—Casselberry's. 17832. A 216.
—Fahnstock's. 17835.81; 17832.38. A 210; A 212.
—Luer's. 17834.58. A 24.
—Mackenzie's. 17835.21. A 212.
—Mathieu's. 17835.81; 17835.22. A 212.
Trephine
—nasal. 17179.29.
Tubes
—tracheotomy. 17290.20; 17290.03; 17290.10; 17290.24; 17290.26; 17290.28; 17290.30; 17290.01; 17290.00; 17830; 17830.26; 17830.27; 17832.35. A 240; A 210.
—Trousseau's, double. 17290.00.

O. Obstetrical Instruments

Abortion instruments. 17832.68. A 11.
Basiotribe (Tarnier's). 17821.171. A 11.
Cephalotribe
—Baudelocque's. 17834.02. A 11.
—Braun's. 17833.59. A 11.
—Hodge's. 17821.52; 17833.97. A 11.
—Lazarewitsch. 17821.54. A 159.
Contraceptive, used about 1750. 17522.20. A 170.
Cranioclast
—oldest form. 17833.41; 17833.43. A 11.
—Holmes'. 17833.42. A 11.
Craniotomy instruments. 1001, CCC.
Crotchets. 17730; 17730.02.
—Davies', guarded. 17833.87. A 11.
—guarded. 17836.41; 17833.46; 17730.50; 17730.52.
—and sharp hook. 17833.45; 17833.451; 17833.452; 17833.453.
Fillet carrier. 17833.501; 17833.50. A 11.
—Markel's. 17833.49. A 11.
Forceps
—craniotomy; Meigs' curved. 17821.16; Meigs' straight. 17821.18.
—embryotomy. 17833.94; 17833.93. A 11.
—obstetrical
—Baudelocque's (1781). 17820.24; 17820.29; 17833.71; 17833.711; 17833.712. A 11.
—Beatty's (1842). 17820.52. A 202.
—Breus' axis-traction (1882). 17833.81. A 11.
—Brickell's (1876). 17834.03. A 11.
—Busch's (1789). 17820.30.
—D. W. Busch (1830). 17833.98. A 11.
—Chamberlen's (1601–1818). No. 1. 17833.68; No. 2. 17833.681; No. 3. 17833.682; No. 4. 17833.683. A 11.
—Chassagny's (1861). 17820.54.
—Churchill's short (1840). 17820.06.
—Davis', D. D. short (1825). 17820.50 17820.10; 17820.46; symmetrical. (1825). 17833.88; asymmetrical. 17819.06–17819.08–17819.10 (three parts). A 11.
—Davis' type. 17821.50; 17820.08.
—Dubois (1850). 17833.76; 17833.75. A 11.
—Elliot's. 17834.18. A 11.
—Haighton's (1790). 17833.85; 17833.851. A 11.
—short. 17820.48.
—Hermann's axis-traction (1840). 17820.47.
—Hewitt's short (1861). 17820.44. A 202.
—Hirst's small (1900). 17833.84. A 11.
—Hodge's (1833). 17820.25; 17820.31; 17836.42; 17833.99. A 11; A 201.
—original. 17820.86. A 96.
—second. 17820.22. A 94.
—Knight's solid blade (1860). 17820.12.
—Lazarewitsch's. 17820.56. A 1591.
—Levret's (one of the earliest type—1747). 17820.00.
—introducing pelvic curve and hollow blade. 17833.69; 17833.691. A 11.
—Maygrier's (1825). 17833.77. A 11.

—Milne-Murray axis-traction (1891). 17833.82. A 11.
—Naegele's (1853). 17833.78 A. 11.
—Orme-Lowder type (1782). 17834.01. A 11.
—Osborn's (1792). 17834. A 11.
—Pajot's jointed (1866). 17833.73. A 11.
—Parvin's (1885). 17820.42.
—Piper's after coming head. 17833.79; 17820.321. A 11.
—Siebold's (1804). 17820.18; 17820.36; 17820.38; 17821.165. A 146; A 203.
—Simpson's long (1848). 17834.17; 17833.72; 17833.721; 17820.40. A 11; A 204; A 253.
—single blade. 17820.80; 17820.76; in use since 1695. 17820.82.
—Smellie's
—straight (1752). 17833.70. A 11.
—with pelvic curve (1752). 17833.701; 17833.702. A 11.
—Tarnier's axis-traction (1877). 17833.83. A 11.
—Taylor's (1875). 17833.74; 17820.20. A 11.
—Wallace's (1865). 17833.80; 17820.32; 17820.27. A 11.
—Young's (1784). 17833.86. A 11.
—unidentified. 17820.02; 17820.04; 17820.34; 17820.14; 17820.16; 17820.26; 17820.28; 17834.04 to 17834.16 inclusive. A 11.
—placenta. 17819.04.
—rotating. 17819; Hodge's. 17833.58; 17833.581; 17819.02. A 11.

Hooks
—blunt. 17833.35; 17833.351; 17833.352; 17720.02; 17720.04. A 11.
—Lazarewitsch's. 17720.06. A 159.
—folding. 17720.10.
—and crotchet. 17720.50; 17720.52; 17720.54; 17720.56; 17833.54. A 11.
—decapitating. 17740; 17833.37. A 11.
—Braun's. 17720.
—obstetrical. 17720.30; 17720.25. A 205.
—Emmet's for pulling forward the cervix. 17833.36. A 11.

Knives
—Galbiati's for cutting the symphysis. 17833.30; 17833.301; 17833.302. A 11.
—Hirst's for cutting the subpubic ligament. 17833.31. A 11.

Obstetrical leg supports. 17833.91. A 11.
Osteotome for cutting cranial bones. 17833 47. A 11.
Pelvimeter. 17833.28; 17832.80. A 11.
—Farabeuf's. 17833.29. A 11.
—Hirst's. 17833.27. A 11.
—Martins'. 17700.00. A 146.
Perforator. 17836.40.
—Blot's. 17821.00.
—Smellie's. 17821.02; 17821.04; 17821.06.
—combined with cranioclast and blunt hook. 17833.48. A 11.
Scissors for cutting umbilical cord. 17829.46. A 146.
Vectis. 17710; 17834.20; 17820.75; 17833.53; 17833.66. A 11.
—and blunt hook. 17834.21; 17836.39. A 11; A 201.
—Chamberlen's double. 17833.55; 17833.56; 17710.02; 17710.04. A 11.
—Lever's. 17833.52. A 11.
—Ryerson's. 17820.78.

P. Ophthalmic Instruments

Aid, magnetic eye. 17835.19. A 212.
Artificial eye; Perrin's. 1029, CCC. A 87; A 212.
Cases
—of cataract instruments. 17648.651; 1083, CCC. A 218.
—couching needle. 17648.652. A 219.
—cataract spoon. 17648.65.
—of other eye instruments. 17648.56; 17648.58; 17648.50; 17648.60; 17560.30; 17648.66; 17291.14; 17648.62; 17648.68; 1074, CCC; 17291.19; 937, CCC; 1030, CCC.; 17291.16; 17648.54; 17648.52; 937, CCC. A 8; A 87; A 212; A 220.
—of instruments for staining corneal scars. 1027, CCC. A 87; A 212.
—of trial lenses. 17291.13; 17291.17; 1022, CCC. A 87; A 225.
Chromoptometer; Chibret's. 1034, CCC. A 87; A 212.
Dilator, lachrimal. 17648.70.
Elevator, for lid. 17648.652. A 219.
Eye glasses
—bifocals; first pair of cemented bifocals made by Wall and Ochs (1888). 17649.45. A 223.
—Chinese
—ancient. 1038, CCC; 1044, CCC; 1045, CCC. A 233.
—modern. 1041, CCC. A 233.

Eye glasses
—combination rest and sun glasses. 1042, CCC. A 233.
—early types. 17649.04; 17649.02; 17649.00; 1039, CCC; 1046, CCC; 1048, CCC.
—oxford. 1043, CCC. A 233.
—square lens. 17649.06.
—for protection
—from snow blindness; Eskimo. 17649.30. A 224.
—against sun. 17649.42; 17649.40; 1040, CCC; 1047, CCC. A 165; A 233.
—with side shield. 17649.44. A 46.
—against heat; Pfund glasses. 17835.16; 17835.81. A 201.
—Japanese. 17649.20; 17649.22. A 222.
—modern. 17649.15.
Eye shield. 17835.91; 17649.50. A 212.
Forceps; entropium. 17832.92; 17648.61.
Geneva lens measure. 1031, CCC. A 87; A 212.
Knives
—canaliculus. 17836.27. A 201.
—cataract. 17835.81; 1068, CCC. A 87; A 212.
—Beer's. 17648.72.
—Desmarre's secondary. 17648.67.
—Dixon's. 17648.72.
—Graefe's. 17648.72.
—Hays'. 17648.653. A 218.
—Jackson's. 1076, CCC. A 87.
—Jäger's. 1077, CCC. A 87.
—Schweiger's. 1082, CCC. A 87.
—White's. 17648.72.
—double edge for tumor operation. 1801, CCC. A 87.
—iridectomy. 17648.74.
—Bell Taylor's. 17648.73.
—set. 17648.64. A 222.
Lancet and scoop. 17835.18. A 212.
Lid plate; Jäger's. 17835.20. A 212.
Ophthalmometer. 17832.09; 1889 model. 17560.095.
Ophthalmoscopes
—Baumeister. 17647.12.
—Beale (1860). 1023, CCC. A 87.
—DeWecker. 1008, CCC. A 24.
—Follin-Nachet (1858–1859). 17832.98. A 37.
—Galezowski (1861–1862). 17647.08.
—Helmholz, modified. 17647.04.
—Jäger. 1019, CCC. A 87.
—modification. 1020, CCC. A 87.
—Knapp's. 17647.05.
—Landholt (1876–1880). 1024, CCC. A 87; A 212.
—Liebreich. 17647.06; 17647.10; 1017, CCC. A 87.
—Loring. 17647.125. A 221.
—original (1869). 17647.20; 17647.16. A 98; A 224.
—pocket. 17647.19.
—with 15 lenses. 17647.18.
—Mauthner (1868). 17833.00; 17647.02; 17647.00. A 37. A 231.
—Morton (1885). 17834.92. A 232.
—Zehender. 17833.01. A 37.
—unidentified. 17832.99; 17832.97; 17832.93; 17647.14. A 37; A 215.
Ophthalmostat
—Jäger's. 17829.27.
Optometer. 17832.02. A 216.
Perimeter; McHardy's. 1037, CCC. A 87; A 212.
Prism for measuring strength of eye muscles. 1028, CCC. A 87; A 212.
Probe, lachrimal. 17835.81. A 201.
—Bowman's. 17648.70.
—Theobold's. 17835.49. A 201.
Refraction set. 17291.15.
Refractometer. 17833.25. A 212.
Retinoscope. 1032, CCC. A 87; A 212.
Scissors
—iris
—with probe point. 17836.58. A 201.
—De Wecker's. 17835.17. A 212.
—Jackson's spring action. 1078, CCC. A 87.
Screw driver for eye glass adjustment. 17836.25. A 201.
Specula
—Critchett's. 17836.26. A 201.
—stop. 17830.66.
Stereoscope; Holmes'. 17560.09.
Tenaculum. 17832.94.
Tonometer
—Bailliart's. 1026, CCC. A 87; A 212.
—Schiötz. 1025, CCC. A 87; A 212.
Vienna Eye Phantom. 1049, CCC. A 87.

Q. Urethral Instruments

Apparatus of Sir Henry Thompson's for establishing a suprapubic fistula in cases of enlarged prostate. 17828.58. A 49.
Applicator. 17291.18.
Bistoury; Charrière's, double (1864). 17828.00.
Boring instruments used to weaken vesical calculi before crushing. 17825.19; 17825.25.

Bougies. 17825.61; 17825.65; 17560.15 to 17560.24; 17823.594; 17824.233. A 146.
—Dodd's improved. 17560.28.
—fabric. 17835.81. A 212.
—filiform. 17831.34.
Calibrator; Kelly's urethral. 17836.12. A 201.
Catheters. 17836.13; 17823.593; 17823.73; 17823.592; 17823.74; 17823.38; 17823.25; 17823.40 to 17823.58; 17823.591; 17823.59; 17823.24. A 146; A 201.
—Coxeter's prostatic. 17823.234.
—double current. 17823.232.
—female. 17835.81. A 212.
—Gouley's tunneled for filiform bougie. 17823.231.
—Kelly's. 17823.741.
—Lellemand's caustic. 17831.31.
—set of. 17827.08. A 63.
—Squires'. 17831.30.
Catheter holder. 17836.15. A 212.
Caustic carrier for bladder. 17835.84.
Chemise, for controlling hemorrhage after operation for bladder stone. 17823.01. A 53.
Circumcision set (1802–1878). 17833.24. A 267.
Cystoscope. 17832.26. A 210.
—Kelly's. 17390.20.
—Simon's. 17823.31. A 171.
Dilators. 17828.01; 17832.31. A 210.
—Stearne's. 17831.25.
Directors
—gorget 17823.33; 17823.28; 17391.18. A 53.
—grooved. 17831.331; 17825.85; 17825.83; 17825.70; 17825.77.
—Symes'. 17825.76.
Divulsors
—Holt's, for urethral stricture. 17832.90. A 37.
—Richardson's. 17402.02. A 248.
Forceps
—lithotomy. 17823.09; 17823.17; 17823.75; 17823.71; 17823.72; 17823.60 to 17823.70; 17832.34. A 171; A 146; A 210.
—curved. 17823.13; 17823.15.
—Hunter's. 17831.52. A 137.
—Thompson's straight. 17823.11.
—phimosis. 17829.29.
—Levis'. 17829.21.
Knives
—lithotomy. 17826.40. A 249.
—Comfrere's. 17831.24.
—Dupuytren's double. 17823.05.
—perineal, with two blades. 17832.08. A 250.
Lithotomy strap. 17823.07.
Lithotrite. 17823.02; 17823.04; 17823.12; 17823.14; 17832.04; 17832.05. A 250.
—Civiales (1871). 17823.20; 17823.00; 17823.10.
—Thompson's (1871). 17831.641.
—Mathieu's (1878). 17823.06.
—Jacobson's. 17823.08; 17823.16.
—Weiss. 17823.18.
Mandrins. 17836.14. A 201.
Scoops
—perineal urethrotomy stone scoop, probe and grooved director. 17825.26.
—Charrière's articulated. 17831.46. A 137.
—lithotomy. 17823.30; 17823.26; 17823.27; 17831.33. A 146.
—with double end. 17825.11; 17825.13.
—and director. 17823.29; 17825.10.
—and conductor. 17825.12.
Sounds
—bladder. 17832.06; 17832.07; 17825.45; 17825.47; 17825.49; 17825.51; 17825.53; 17825.55; 17825.57; 17825.59; 17825.63; 17825.67; 17825.69; 17825.71; 17825.73; 17827.06; 17825.18; 17825.17.
—curved, male. 17825.22; 17825.23.
—straight, female. 17825.20; 17825.21.
—with forceps and probes. 17827.30. A 7.
—renal. 17823.21. A 146.
—urethral. 17291.06; 17290.76; 17835.81. A 212.
—Fowler's. 17836.17; 17836.16. A 201.
Staff
—lithotomy. 17825.66; 17825.68; 17825.74; 17825.78; 17825.80; 17825.81;
—Littles'. 17825.82; 17825.84; 17825.86 to 17825.91; 17825.97.
Syringe, vesical for male bladder. 17832.17. A 210.
—of pewter. 17090.52; 17090.54; 17090.56; 17090.58; 17090.60.
Trilabes. 17825.31; 17825.33; 17825.37; 17825.39; 17825.41; 17825.43; 17825.35; 17833.17.
Trocar for puncturing bladder through rectum. 17832.36. A 210.
Set of *Urethral* instruments. 17291.12; 17921.00; 17827.28; 17827.18. A 251; A 211; A 256.
Urethrotomes. 17836.11; 17821.21; 17831.22; 17831.23. A 201.
—and dilators. 17828.60.

R. Foreign Instruments

R. 1. Chinese

Acupuncture needles. 17006.10. A 286.

R. 2. Japanese

Acupuncture needles. 17001.05; 17002.00; 17006.05; 17006.24. A 49; A 53.

Blow pipe. 17007. A 53.

Catheter. 17005.

"*Kotsu-do-seigo-zuseta*", booklet published in 1726; a note of antomy and a model of human body to be used in acupuncture, mokusa and massage. 17009.

Lancet. 17004.

Medicine scoop. 16005. A 53.

Pill counter. 16007. A 53.

Probe 17003. A 53.

Spatula. 16006. A 53.

Unidentified. 16008; 16009.

R. 3. Korean

Acupuncture needles. 17006.15. A 285.

Heating instrument. 17006.15. A 285.

Lancet and acupuncture needle. 17006. A 144.

R. 4. Replicas of instruments found in the ruins of Pompeii

Catheters. 17500; 17500.14. A 40.

Cup for bleeding. 17516. A 40.

Elevators. 17505; 17513. A 12.

Forceps. 17504. A 12.

Lancet. 17502; 17510. A 12.

Perforator (obstetrical). 17503. A 12.

Pincette. 17506. A 12.

Sound. 17509. A 12.

—and curette. 17512. A 12.

Specula

—anal. 17508. A 12.

—uterine. 17507; trivalve. 17507.10. A 12.

Tenaculum. 17511. A 12.

Trocar and Cannula. 17501. A 12.

PART VIII

LANTERN SLIDES

J. S. Fraser Collection illustrating normal and pathological anatomy of the *ear.*

—17832.84. A 82.

Addinell Hewson's Collection from a case of *obstruction* of left *bronchus* in a patient having catarrhal bronchitis following operation for acute appendicits. 17832.86. A 112.

B. B. Vincent Lyon Collection in its own illuminated cabinet illustrating *duodenal tube drainage of biliary tract.* 1066, CCC. A 172.

P. Alexander Randall Collection illustrating the anatomy and pathology of the *eye* and *ear.* 17832.85. A 81.

J. P. Tunis Collection showing *human head sections.* 17832.87. A 43.

Brain slides. 17832.88.

Slides showing human emotions. 17832.88.

PART IX

MICROSCOPIC SLIDES

A. Scientific

Aneurisms

—sections of, prepared by H. D. Schmidt. 11030. A 44.

Brain sections from a case of acute delirium. 9360 (20 i). A 162.

Breast

—cancer. 17831.09. A 173.

—and Paget's Disease of nipple; squamous epithelioma. 17831.04. A 173.

—scirrhus. 17831.10. A 173.

—showing spread of cancer from primary growth by connective tissue septa. 17831.06. A 173.

—carcinoma and fibroadenoma lying in intimate contact. 17831.02. A 173.

—fibroadenoma and malignant papilloma. 17831.03. A 173.

—Paget's Disease. 17831.08. A 173.

—tumor in central portion. 17831.05; 17831.07. A 173.

Cholera

—spinal cord of a choreic dog. 11000. A 162.

Embryo (human)

—section of two week old embryo. 9359.

Eye. 932, CCC. A 177.

Fibroma, of foot. 11015. A 19.

Leprosy. 11020.

Lesions of the *nervous system* in *yellow* fever. 11050.

Paraplegia (traumatic); degeneration of the spinal cord. 11115.

Spindle cell sarcoma of the choroid. 11116.00. A 165.

Tuberculosis. 11051; 11110.

Tumors, various types. 11052.

B. Historical

Slides on *tumors*, *leprosy*, *syphilis* and *tuberculosis* prepared by the following physicians from 1883 to 1885: Drs. Evans, E. H. Ochsner, Watson, Bierly, J. H. Brinton, J. C. Wilson,

T. G. Morton, M. B. Musser, Livingston, Werner, J. H. Hutchinson, W. H. Pancoast, J. M. DaCosta, E. D. Cope, D. H. Agnew and Wlliam Hunt. 17830.46.

Histological slides from the *Pathological Laboratory* of the *University* of *Pennsylvania* prepared by Dr. A. P. C. Ashhurst, 1897–1900. 17830.56; 17830.57; 17830.58.

Miscellaneous collection of slides purchased from *Professor Hyrtl*. 17830.59; 990, CCC. B.

Slides prepared in 1876. 991. CCC.

Slides prepared by *Dr. H. Augustus Wilson* of blood discs and organs of various animals. 11010; 11011.

Microscopic section of spleen and attached glands from *Guy's Hospital*, London. The second case reported by *Dr. Thomas Hodgkin*, 1832. 953, CCC. A 170. Tissue slides of original *Hodgkin's Disease*. 1005, CCC. A 290.

PART X

HISTORICAL GIFTS TO THE MUSEUM

A. Medical

Adipocere body; "The Petrified Lady", body of a fat woman changed to adipocere. 13000. B.

Bone plates; perforated for approximation in operation for making intestinal anastomosis. 13673. A 188.

Canes, gold-headed

—of Dr. Isaac Hays. 13640 B. A 185.

—of Dr. Benjamin Rush. 13640 A.

Card plate of Dr. Philip Syng Physick. 13639. A 178.

Death masks

—of Dr. John Hunter. 13055; 17832.73. A 53; A 181.

—of Prof. Joseph Leidy. 13056. A 182.

Exercise Chair. 13627. A 183.

Gavel presented to Dr. W. W. Keen when he was President of the American Medical Association. 13625. A 53.

Hair; Peter Arrell Browne's Collection. 13675. A 8.

Japanese doctor's honorary sword from Kiota. 13645. A 36.

Japanese medical supplies captured in the Burma campaign, World War II. 1018, CCC. A 291.

Medal of Dr. Joseph Pancoast. 13638.

Obstetrical Chair from Asia Minor. 13628. A 184.

Office sign bearing the name

—"Dr. Ashhurst." 13641.

—"Dr. Pancoast." 13637.

Opium bottled in 1853 and assayed in 1939. 13676 (29). A 171.

Dr. H. Augustus Wilson's collection of shoes from many nations. A 191.

—Africa. 13711.01.

—Abyssinia. 13707.01.

—Egypt. 13704.01; burial slippers of 200 B.C. 13702.

—Tunis. 13707.12.

—Alaska. 13707.10.

—America. 13703.04; 13706.05; 13714.

—Indian. 13706; 13707; 13707.07; 13707.09.

—Arabia. 13706.04; 13706.09; 13709.02.

—Austria. 13707.08.

—Bolivia. 13704.

—Brussels. 13707.21.

—China. 13702.01; 13706.02; 13707.06; 13707.20.

—Costa Rica. 13711.02.

—East Indies; Malay. 13705.03; 13713.

—Esquimo. 13703.

—France; French Empire. 13704.02; modern. 13706.06.

—Holland. 13704.06.

—India. 13704.05; 13705; 13706.03; 13707.04; 13708.01.

—Japanese. 13705.01; 13705.05; 13707.15; 13709; 17834.98.

—Java. 13704.07.

—Klondike. 13707.11.

—Korea. 13705.02; 13705.025; 13706.10; 13708.

—Madeira. 13703.02.

—Malta. 13706.08.

—Mexico. 13706.07; 13707.17; 13707.18; 13707.19; 17834.97.

—Morocco. 13705.04; 13707.02.

—Norway. 13704.03.

—Philippine Islands. 13704.08; 13709.01; 13711.

—Russia. 13707.14.

—Shetland Islands. 13706.01.

—Siberia. 13703.01.

—Spain. (1492). 13710.

—Sweden. 13704.04.

—Syria. 13703.02; 13707.03; 13707.05.

—Turkey. 13707.16.

—worn by Pligrims to Mecca. 13712.

Dr. H. Augustus Wilson's collection of shoes from many nations
—Venezuela. 13707.13.
—Zanzibar. 13711.03.
Stockings. A 191.
—five digit. 13701.02.
—single digit. 13701.
—Japanese. 13701.1.
—Waukenhose. 13701.03.
Book of photographs of the collection of Shoes. 13715. A 191.

B. Military.

Arrows, used in Indian warfare. 13650. A 49.
Battleship Maine souvenir; piece of iron. 13635.
Bullets from Spanish American War. 13631; 13632; 13633; 13634.
"Dog-tags", worn on the soldier's person at all times during World War II. 17835.97. A 189.
Helmets used in World War I.
—British. 17830.99. A 55.
—French. 17831.00. A 55.
—German. 17830.98. A 55.
—Italian. 17831.01. A 271.
Machete from the Moro Tribe of New Guinea. 17836.03. A 190.

C. General

Beer mugs (3) from Göttingen. 13015. A 180.
Booth, John Wilkes; piece of thorax of the assassin of President Lincoln procured at the post-mortem on the Monitor opposite the Navy Yard, Washington, by the Surgeon General and staff. 13671. A 187.
Etruscan necklace dating 300 B. C or 400 B. C. 17515. A 39.
Japanese antique game. 13670.5. A 186.
Nuer relics
—belt. 16500.22. A 79.
—bracelet. 16500.14; 16500.16. A 79.
—spear worn for protection against enemies and animals. 16500.12; 16500.18; 16500.20. A 79.
—fishing. 16500.10. A 79.
Tsantsa; shrunken human heads prepared by the Jibaro Tribes who occupy the Western slope of the Andes. 13610; 13615. A 39; A 40.
Watches
—very old, made in London. 17834.36. A 259.
—from the earthquake and fire in San Francisco, 1906. 13674. A 7.
Welded Horn. 13500.10.

PART XI

PHOTOGRAPHS, SKIAGRAPHS AND DRAWINGS

Abnormalities
—congenital malformations and deformities. 15037; 15808.
—paralytic deformities. 15822.
—teratological illustrations. 15809; 15810.
—Filipino with a tail. 15703; 15704.
—Siamese Twins
—dissection. 15811 A.
—autopsy. 7001 a;b.
Acromegaly and *Giantism.* 15703; 17832.72; 15219; 15221.
Anatomical. 15804; 15803; 15811 B; D; 15833.
—brain sections. 17821.
—ear. 15015.
—legs, sculptured to show emotions. 15724.
—pelves. 15711; 15806; atlas of female pelves. 15824.
Apparatus
—for correcting deformities. 15827.
—Lister spray. 15836.
Dislocations. 15811; 15037.
Embryology. Chimpanzee fetus. 15725; 15726.
Histological
—photomicrographs of optic tissue. 15819.
—report (1870) on histology of minute blood vessels. 15229.
Historical, pathological and zoological photographs from the Surgeon-General. 15800; 15829.
Medical illustrations
—enlarged heart and spleen. 15830.
Miscellaneous. 15703
—Belts of Chastity.
—insects. 15829.
—crab louse. 15046; 15703.
—rattlesnake and vermin
—plates from Mitchell and Reichert's monograph. 15801.
—shoes
—album of H. Augustus Wilson's Collection and album of barefooted and sandal wearing peoples taken by Dr. Phil Hoffman at Louisiana Purchase Exposition in 1904. 13715.
Obstetrical and *Gynecological.* 15816; 15817.
Pathological
—pictorial notebook from China. 15705. This shows
—elephantiasis

—skin diseases
—tumors
—elephantiasis. 15717.
—eye
—diseases. 15815; neuroma of lid. 15812.
—face and jaw diseases. 15803.
—fractures. 15805; 15806; 15831.
—gunshot wounds and fractures from the Surgeon-General. 15000; 15001.
—skiagraphs of. 15036; 15037.
—gout and polyarthritis. 15723.
—hernial ulceration. 15805.
—Hodgkin's Disease. 15805.
—atlas showing lesions of small and large intestines. 15828.
—nervous diseases. 158110; 15813.
—obesity. 15713.
—rickets. 15070.
—skin diseases. 15811 D; 15826; 15705.
—syphilitic illustrations. 15039; 17832.71.
—trench foot. 15707; 1007, CCC.
—tumors. 15825; 15705.
—veneral diseases. 15826.
Surgical. 15823.
—amputations. 15000; 15001; 15805; 15806.
—from Civil War. 15829.
—orthopedic surgery. 15822.
—rhinoplasty. 15703; 15013.
From World War I
—showing effects of mustard gas; pictures of trench foot; operations. 1007, CCC.
—trench foot. 15707.

Officers, Committees, Sections, and Administrative Staff of the College

1949

President

T. Grier Miller

Vice-President

Richard A. Kern

Secretary

Leandro M. Tocantins

Treasurer

William D. Stroud

Censors

John H. Gibbon
Francis R. Packard
Edward B. Krumbhaar
O. H. Perry Pepper

Honorary Librarian

William Egbert Robertson

Councillors Elected

To serve until January, 1950
J. Harold Austin
William Harvey Perkins

To serve until January, 1951
Thomas Fitz-Hugh, Jr.
Charles C. Wolferth

To serve until January, 1952

Karl Musser Houser
Lewis C. Scheffey

Council

The forenamed, Ex-presidential councillor J. Parsons Schaeffer, and the chairmen of the standing committees

ELECTIVE STANDING COMMITTEES*

Library

Truman G. Schnabel, *ch'n*
John H. Arnett
W. Emory Burnett
Louis B. Laplace
Jonathan E. Rhoads
The Honorary Librarian (*ex officio*)

Hall

William P. Belk, *ch'n*
John Eiman
J. Vernon Ellson
Thaddeus L. Montgomery
Warren S. Reese

Mütter Museum and College Collections

Oscar V. Batson, *ch'n*
Paul C. Colonna
R. Philip Custer

Publication

Francis C. Wood, *ch'n*
David A. Cooper
Balduin Lucké

* The President is an *ex officio* member of all Standing Committees.

APPOINTIVE STANDING COMMITTEES*

Finance

Francis C. Grant, *ch'n*
Charles L. Brown
Arthur M. Dannenberg
The Treasurer (*ex officio*)

Entertainments

Gilson C. Engel, *ch'n*
William A. Jeffers
Adolph A. Walkling

Scientific Business

Edward L. Bortz, *ch'n*
Oscar V. Batson
Earl D. Bond
Thomas M. Durant
Francis D. W. Lukens
Hubley R. Owen
I. S. Ravdin
The Secretary (*ex officio*)

Public Health, Preventive Medicine and Public Relations

Hubley R. Owen, *ch'n*
Theodore R. Fetter
Samuel B. Hadden
Maurice S. Jacobs
Aims C. McGuinness

PRIZE COMMITTEES AND TRUSTEES

Alvarenga Prize and Lectureship

I. S. Ravdin, *ch'n*
John V. Blady
Peter A. Herbut
Eugene P. Pendergrass
Edward Weiss

Weir Mitchell Oration

Earl D. Bond, *ch'n*
Bernard J. Alpers
Kenneth E. Appel
Francis C. Grant
Baldwin L. Keyes

Trustee under the Will of Thomas Skelton Harrison

J. Parsons Schaeffer

Nathan Lewis Hatfield Prize and Lectureship

Francis D. W. Lukens, *ch'n*
Jesse T. Nicholson
H. Curtis Wood, Jr.

Mary Scott Newbold Lectures

Thomas M. Durant, *ch'n*
Julian Johnson
Craig W. Muckle
The Chairman of the Committee on Scientific Business (*ex officio*)

Trustees of Nathan Lewis Hatfield Prize and Lectureship

William D. Stroud
J. Montgomery Deaver
Thomas Fitz-Hugh, Jr.

Honorary Director of the Department of Medical Arts

Samuel B. Sturgis

Honorary Legal Counsel

Eric A. McCouch

* The President is an *ex officio* member of all Standing Committees.

OFFICERS OF THE SECTIONS

General Medicine

William G. Leaman, Jr., *ch'n*
William A. Jeffers, *clerk*

Executive Committee: Charles L. Brown, Edward Rose, Leandro M. Tocantins

Medical History

Maurice S. Jacobs, *ch'n*
Herbert T. Kelly, *clerk*

Executive Committee: Louis B. Laplace, William G. Leaman, Jr., Russell Richardson

Ophthalmology

Perce De Long, *ch'n*
M. Luther Kauffman, *clerk*

Executive Committee: Burton Chance, Alfred Cowan, Warren S. Reese

Otolaryngology

Louis H. Clerf, *ch'n*
Edward H. Campbell, *clerk*

Executive Committee: Oscar V. Batson, William Hewson, Gabriel Tucker

Public Health, Preventive and Industrial Medicine

David A. Cooper, *ch'n*
Paschal F. Lucchesi, *clerk*

Executive Committee: John H. Arnett, Maurice S. Jacobs, Charles-Francis Long

---

ADMINISTRATIVE STAFF OF THE COLLEGE

Librarian and Editor

W. B. McDaniel, 2d

Curator of the Mütter Museum and Custodian of the College Collections

Ella N. Wade

Clerk of the College

Olga E. Lang

Superintendent

Alfred F. Nelson

TRANSACTIONS & STUDIES

of the

College of Physicians of Philadelphia

Volume 17
(Fourth Series)

Number 2
(June 1949)

Cancer of the Lung*

By JOHN H. GIBBON, JR., M.D.

Professor of Surgery and Director of Surgical Research,
Jefferson Medical College of Philadelphia

I DEEPLY appreciate the honor of being invited to give the Sixty-first Mütter Lecture at the College of Physicians. The lectureship and the Mütter Museum were founded by Thomas Dent Mütter, Professor of Surgery at the Jefferson Medical College from 1841 to 1856. Mindful of my distinguished predecessors in this Lectureship, I offer you the following discussion of carcinoma of the lung with humility, realizing the paucity of my contribution, but hoping to elicit your interest in a subject in which I have been deeply concerned for the past three years.

Much of what I have to say is based upon an experience with 182 patients with proven primary carcinoma of the lung. This is a consecutive series of cases observed during the past 32 months at the Jefferson Medical College Hospital. I should like to preface my remarks by expressing my gratitude to those who have been associated with me in this work. My associate, Dr. Allbritten has performed a number of the operations which will be reported here. Dr. Stayman has worked untiringly in following up the patients, analyzing the data and in helping to develop and study our current method of anesthesia. Dr. Miller has made studies of blood volume, and is currently working on an improved oximeter to record arterial oxygen saturation during operations. Dr. Healy has painstakingly studied the intrapericardial anatomy of almost 200 cadavers. To Dr. Clerf I am indebted for the diagnosis and referral of the great majority of these patients and to Dr. Herbut I am indebted for his patient study of the bronchial secretions in the search for neoplastic cells and for his pathologic examination of the surgical specimens. To Dr. Willauer, I am grateful for his loyal support and interest in the studies reported here. Finally, I want to express my gratitude to all the residents and nurses who have assisted in the operations and the care of the patients.

From these remarks you may correctly surmise that the proper handling of a patient with cancer of the lung involves team work from the time the patient has his first symptom through the various steps of diagnosis, preoperative management, operative treatment, and postoperative care to the final follow-up of the cases. The subject of cancer of the lung is not untimely, since the lung is apparently rapidly becoming one of the most frequent sites of cancer. Indeed, Dr. Evarts Graham, speaking in this city last week called it "the

* Thomas Dent Mütter Lecture LXI, College of Physicians of Philadelphia, 2 February 1949.

number one cancer." In support of his statement, Dr. Graham referred to the incidence of cancer in the St. Louis City Hospital and in the Charity Hospital at New Orleans. These hospitals are both municipal institutions which admit no referred cases from outside the city limits. In recent years more patients have been admitted to these hospitals with cancer of the lung than of any other organ. Cancer of the stomach has fallen into second place in these institutions. I seriously doubt whether this experience has been duplicated throughout the country, nevertheless no one today will deny that cancer of the lung is of frequent occurrence and presents as important a problem as cancer of the breast, stomach, colon and uterus. Probably one of the reasons for the increased frequency of cancer of the lung is man's longevity. Fifteen to 20 years has been added to the natural span of life in the United States during the past three or four decades. In the United States in 1940, the life expectancy was approximately 64 years, based on statistics of the Metropolitan Life Insurance Company.

Age:

Cancer of the lung, as cancer of other organs, is a disease with its greatest incidence in the latter decades of life. In our series of 182 cases, the mean age of the patients was 57 years and the range was from 41 to 75 years of age, with one exception of a patient aged 22. The greatest frequency occurs between the ages of 45 and 65. This agrees with figures reported by Björk (1), Fried (2), Ochsner and DeBakey (3) and many others.

Sex:

It is primarily a disease of males. Ochsner and DeBakey (3) in analyzing over 8,000 reported cases found approximately 80 per cent males, and 20 per cent females. In our series the proportion of males is even higher, there being nine men for every woman. This is similar to the proportion of males Björk (2) found in 345 cases treated at the Brompton and the Royal Cancer Hospitals in London. The explanation for this difference in sexes is not apparent.

Pathology:

Cancer of the lung may be divided into two main pathologic types. The first consists of carcinoma arising from squamous cell metaplasia of the bronchial mucosa. These tumors are typical epidermoid, or squamous cell, growths. The second group consists of carcinoma arising from the columnar cells of the bronchial mucosa or mucous glands. These may be subdivided into two groups; first, the well-differentiated adenocarcinoma and second, the undifferentiated group comprising the oat cell carcinoma and including that rare group of so-called alveolar cell carcinomas.

Strangely enough, most tumors are not adenocarcinomas but are squamous cell carcinomas, arising from metaplasia of the columnar cells lining the bronchi. In Björk's series they were 50 per cent of the group and in Ochsner's series (4) they were 40 per cent. It should be pointed out, of course, that in the same tumor one may find areas typical of adenocarcinoma and other areas with typical epithelial pearls. Ten to 20 per cent of the tumors are well-differentiated adenocarcinomas. The remaining cases fall into the undifferentiated type. Björk (1) found no relation between age and pathologic type of bronchogenic carcinoma, while Ochsner found a somewhat higher proportion of epidermoid and undifferentiated growths in the older age groups. There is a higher proportion of adenocarcinoma among women than among men. This is to be expected from greater prevalence in women of so-called bronchial adenomas or, perhaps more properly, mixed tumors of the lung. When these tumors undergo malignant change, they appear as typical adenocarcinomas.

Cancer of the lung has been classified according to its anatomical location, as hilar tumors, peripheral tumors, and those occupying an intermediate position. No correlation has been found betwen anatomical location and pathologic type. Ochsner (4), in a careful analysis of survival rates in relation to

histologic type, found the most favorable rate in patients with squamous cell carcinomas and the most unfavorable in the undifferentiated groups. The survival rate was better in women than in men. It is only proper to point out that Björk (1) in his analysis was unable to find any statistically significant difference in the rate of growth according to histologic type. Our material covers too short a period of time to be analyzed from this point of view.

I shall only mention briefly the relation of the so-called bronchial adenomas to cancer. Suffice it to say that these tumors are more frequent in women than in men, that their base tends to involve the deeper structures of the bronchial wall so that recurrences are likely to occur following endoscopic removal, and finally that these tumors are now all regarded as potentially malignant. Evarts Graham (5) has collected some 30 instances of these tumors with positive evidence of distant metastasis, usually to the regional lymph nodes, to the opposite lung, or to the liver. Finally, the small group of rare alveolar cell carcinomas should be mentioned. These tumors are prone to involve the pleural surfaces early in the course of the disease and have invariably proved to be rapidly fatal. There have been four such cases in our series.

Sites of Metastasis:

As with other carcinomas, the lymph borne metastases are most common. These occur first in the mediastinal lymph nodes. If the growth is in the upper lobe, the nodes involved are found along the superior margin of the bronchus and the trachea. In the lower lobe, the glands involved are found along the inferior margin of the bronchus and just beneath the carina. The next most frequently involved are the cervical nodes lying just above the clavicle. Fortunately, these can easily be detected by palpation and if enlarged nodes are found, they should be biopsied. The axillary nodes are occasionally involved. The bones, the liver, and the brain are the most frequent sites of blood borne metastases. The kidneys, the adrenals, the subcutaneous tissues and the skin are the next most frequent sites.

Diagnosis:

The diagnosis of cancer of the lung is made on the symptoms and a very few special examinations. The most frequent first symptom is that of cough, the second consists of fever and evidence of infection in the lungs and the third most frequent symptom is discomfort in the chest, which is rarely actually pain, and which often can be localized at the site of the lesion. These symptoms necessarily depend on the location of the growth. It is obvious that the more peripheral tumors will be symptomless for a long time. The only hope of diagnosing these lesions before they produce symtoms is in an x-ray examination of the chest. In this city a number of such lesions have been found on routine surveys on 35 mm. film by Dr. Katharine Boucot. It is easy to understand why cough is an early symptom because the growth originates in the bronchial mucosa and reflexly stimulates the cough mechanism. The symptoms of infection which are called pneumonitis result from the blocking of a bronchus with atelectasis or retained secretions distal to the growth with resultant infection. Actual pain occurs in the peripheral growths that have involved the structures of the chest wall. It is a bad prognostic omen. On the other hand, most of these patients listed as having pain complained merely of discomfort in the chest and this is probably related to the mechanical effects produced by the tumor, such as atelectasis or occlusion of a bronchus.

Fig. 1 illustrates the frequency of some common symptoms presented by these 182 patients at the time the diagnosis was established. Hemoptysis, usually no more than blood streaking on one or two occasions, results from ulceration of the growth in the bronchus. It occurred in slightly more than half the patients. Weight loss, strangely enough, is a common symptom. The most logical explanation for this would appear to be loss of appetite from the constant cough and expectoration, and interference with normal sleep and rest. The

shortness of breath may be related to the mechanical effects of the tumor interfering with normal aeration of all or part of one lung. Wheezing, especially if unilateral, is of great diagnostic significance. It is due to partial occlusion of a bronchus by a growth, and is particularly obvious during expiration, when it becomes difficult to expel air past the bronchial obstruction. Finally, a significant proportion of patients at the time of entrance to the hospital gave evidence of persistent infection in the lung.

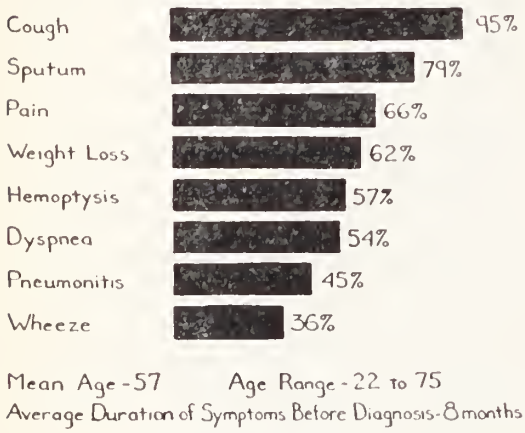

FIG. 1. SYMPTOMS

Other Diagnostic Aids:

An x-ray examination of the chest is of the utmost importance. In only two patients was the x-ray examination negative. In both these patients the diagnosis was made on bronchoscopic examination. In all the others, the appearance of the roentgenograms was consistent with a diagnosis of cancer. It should be pointed out that particularly in the central growths the areas of abnormal density seen are due to the mechanical presence of the tumor producing atelectasis, retained secretions, etc. In the intermediary and peripheral growths, of course, some if not all of the density is due to the actual tumor itself.

Bronchoscopic examination is indicated in every suspected case of carcinoma of the lung. By means of the bronchoscope a positive tissue diagnosis was arrived at in 82 per cent of all patients seen by us. In 35 per cent only of the entire group could a biopsy be made. This means, of course, that only 35 per cent of the tumors in our series lay in the main bronchi, or within reach of the bronchoscope in the lower lobe bronchi. Growths in the upper lobe bronchi can only be biopsied when they protrude into the main bronchus.

In our series, the cytological examination of bronchoscopically aspirated secretions from the suspected lobar bronchus has proved a great aid in confirming the diagnosis of carcinoma of the lung. In approximately one

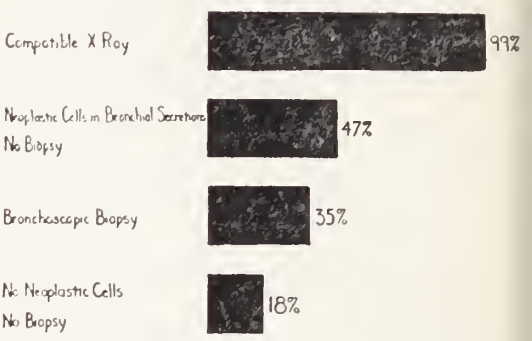

FIG. 2. DIAGNOSIS IN 182 PATIENTS WITH CARCINOMA OF THE LUNG

half of the patients in our series (Fig. 2) the diagnosis was confirmed by finding neoplastic cells in the bronchial secretions. We have deliberately omitted reference to the finding of neoplastic cells in the bronchial secretions in patients where a biopsy was obtained. From a practical point of view this finding is unimportant because the diagnosis has already been established by the biopsy. However, in a majority of our group a biopsy could not be obtained, and in these patients the finding of neoplastic cells was of great help in confirming the diagnosis. Finally, in approximately one-fifth of the patients explored without benefit of biopsy or the finding of neoplastic cells the diagnosis was obvious from the history and the x-ray findings. This group serves to emphasize the importance of prompt exploration even though a diagnosis cannot be confirmed histologically.

Treatment:

The treatment of choice is operative removal of the tumor *en masse*, together with the regional lymph nodes. In those cases where operation is impossible because of invasion of vital structures, or because of distant metastasis, deep roentgen therapy is the treatment of choice. There are only a few reports in this country of patients surviving three years following such treatment. Björk (1) in London reported only three patients who survived three years or more following deep x-ray therapy. He found that about one-third of the patients treated survived one year, only 15 per cent two years. As with cancer in other parts of the body, many substances have been tried for palliation, such as the nitrogen mustards and other chemical substances. At the present time there are not enough treated cases on record to evaluate such treatment.

Distant Metastasis:

In our experience distant metastasis was most often found in the supraclavicular lymph nodes on the same side as the pulmonary lesion. Any palpable lymph node lying just above the clavicle should always be removed under local anesthesia and examined microscopically for metastasis before thoracotomy is done. The next most common recognizable metastasis in our experience has been a subcutaneous metastatic nodule. One of these we found in the skin of the back on the same side as the pulmonary lesion over the center of the latissimus dorsi muscle. Another, the size of a small pigeon's egg, could be felt in close relation to the sciatic nerve in the upper third of the thigh. It was thought to be a neurofibroma but on pathological examination it proved to be a metastatic pulmonary carcinoma. Another occurred beneath the skin of the abdominal wall. The axillary lymph nodes are frequently palpable on both sides in adults over the age of 40. We have removed a number of these lymph nodes and in only three instances was a metastatic growth found. At present we remove axillary lymph nodes only if there is a distinctly enlarged node on the same side as the pulmonary lesion. Bone metastases are rarely discovered by x-ray at an early stage. The most common site of bone metastasis is the ribs. Next are the vertebral bodies, but one should remember that two-thirds of a vertebral body may be destroyed before there is x-ray evidence of metastasis. Six patients in our series had evidence of cerebral metastasis and hence were not operated upon. The adrenal glands are quite frequently involved by metastasis, but unfortunately it is impossible to recognize this metastasis at an early stage. Involvement of the liver is also difficult to detect early but fortunately it is not a frequent site of metastasis.

Special Conditions in the Hemithorax:

Besides distant metastasis, there are certain signs and symptoms in the involved hemithorax which have been regarded as contraindications to operation by some surgeons. A pleural effusion which contains neoplastic cells is a contraindication to operative treatment. The only possible exception to this is the alveolar cell carcinoma. All four patients in our series with this condition had a pleural effusion. In two patients an operation was attempted in the hope of performing both a pleurectomy and a pneumonectomy. However, this proved to be impossible in both cases. A bloody pleural effusion is generally regarded as a contraindication to operation. A clear pleural effusion, or a cloudy one without blood, in which neoplastic cells cannot be found, generally indicates extensive blockage of lymphatic channels by tumor cells. However, occasionally a loculated pleural effusion may result from infection of the parenchyma of the lung distal to the tumor and we have on occasion explored patients with a pleural effusion and performed a pneumonectomy.

We have performed pneumonectomy in many patients with paralysis of the phrenic nerve. These patients usually have lower lobe lesions, and as the phrenic nerve is in intimate contact with the pericardium in the lower part

of its course, such cases invariably require resection of a part of the pericardium.

We have seen no patients with involvement of the recurrent laryngeal nerve on the right side due to the tumor. We have explored five patients with paralysis of the left recurrent nerve, and all have proved to be inoperable because of invasion of the wall of the aorta. These were all left upper lobe lesions. An additional four patients with left recurrent nerve palsy were considered inoperable for other reasons.

Involvement of the vagus nerve, of course, cannot be detected prior to operation and is of no significance as this nerve can be resected with impunity. Indeed, the nerve is often resected routinely, rather than dividing the branches to the lung, in order to facilitate block dissection of the hilar area.

Growths at the superior thoracic outlet, confined by the narrow arc of the first rib, not infrequently produce Horner's syndrome from pressure on the stellate ganglion and give rise to pain in the arm from pressure on the cor. This has been described as Pancoast syndrome, and the tumors in this location called superior pulmonary sulcus tumors. Sixty per cent of tumors producing this syndrome originate in the lung. However, the syndrome may also be produced by ganglioneuromas or neurilemmomas which have undergone malignant change. Patients exhibiting Pancoast's syndrome are usually inoperable, but we believe that exploration is justifiable.

A carcinoma in the medial portion of the right upper lobe is likely to invade or compress the superior vena cava. Where such compression is evident before operation we have found the lesion to be inoperable. However, we do not regard this symptom as a contraindication to operation because the vena cava may be merely compressed by the tumor without actual invasion of its wall. We have explored ten such patients, but have not yet found an operable lesion. We hope to find a case with partial invasion of the wall of the superior vena cava that can be successfully resected with the aid of a suitable clamp, such as the ingenious one devised by Potts.

Results:

Having briefly considered incidence, pathologic type, diagnosis and treatment, it is appropriate to consider the results of treatment and how they can be improved. The disposition of the patients in our series is shown in Figure 3. Approximately two-thirds of the

OPERABILITY, RESECTABILITY AND OPERATIVE MORTALITY

NUMBER OF CASES OBSERVED	CASES EXPLORED		CASES RESECTED		OPERATIVE MORTALITY IN RESECTED CASES, PER CENT
	Number	Per cent	Number	Per cent of explored	
182	125	68	76	61	17

FIG. 3

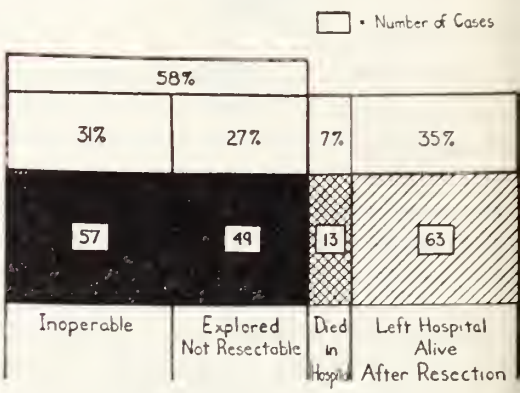

FIG. 4. DISPOSITION OF 182 CASES

patients were explored and approximately two-thirds of those explored were resected. The operative mortality was 17 per cent.

These results are presented more graphically in Figure 4. As you can see, slightly over half the patients have no chance at all of being cured of their disease after the diagnosis is made. These comprise those patients who are judged to be inoperable when first seen, and also those patients who were explored and found to be inoperable. Here the surgeon is helpless. A reduction in this shock-

ingly high proportion of doomed patients must be made by the patient himself, and the general practitioner. Björk (1) found an average period of 8.4 months between the first symptom and the time when diagnosis was made. In our 182 patients, the average time was also eight months. In Björk's report, three and one-half of these months was the result of the patient's failure to consult a doctor. The other five months was due to the doctor's failure to arrive at a diagnosis after the patient had consulted him. Education of the general public is important. Everyone over the age of 40 who has a dry, persistent cough should immediately consult his doctor. It is more important, however, to arouse the general practitioner of medicine to the necessity of making a prompt, definitive diagnosis in patients of the cancer age group who present symptoms suggestive of carcinoma of the lung.

The remarks just made regarding prompt diagnosis also apply to some extent to those patients, 35 per cent of our group, who have survived the operation of resection of the tumor. The late deaths in this group from distant metastasis (Fig. 5) can only be prevented by earlier operation, which in turn depends upon a prompt diagnosis. Responsibility for the late deaths from local recurrence of the growth can also at times be laid on the shoulders of the surgeon who failed to perform a sufficiently radical operation. In the peripheral growths it may be necessary to resect portions of the chest wall and some or all of the diaphragm. In the central growths, it may be necessary to remove a portion of the trachea itself. In all cases, a block dissection must be done with removal *en masse* of all the lymph nodes draining the lung. In the lower lobe lesions, this frequently entails removal of lymph nodes along the inferior margin of the opposite main bronchus. In the upper lobe lesions, it means removal of all of the chain of lymph nodes along the trachea as well as a mass removal of all the nodes along the superior margin of the main bronchus. Finally, it is frequently necessary to remove a large portion of the pericardium. This is especially true in tumors of the lower lobe which frequently extend along and directly invade the inferior pulmonary vein. In many of these, there may be an insufficient length of the pulmonary veins outside the pericardium to permit safe division and proximal ligation. For these reasons, in our series of 76 resections, we have widely opened the pericardium and ligated the hilar vessels within the pericardial sac in 42 per cent. Because of the lack of available anatomical studies in this region, Dr. Healy and I have studied the intrapericardial anatomy in 182 bodies (6). In brief, it can be stated that many patients would have been regarded as inoperable if intra-

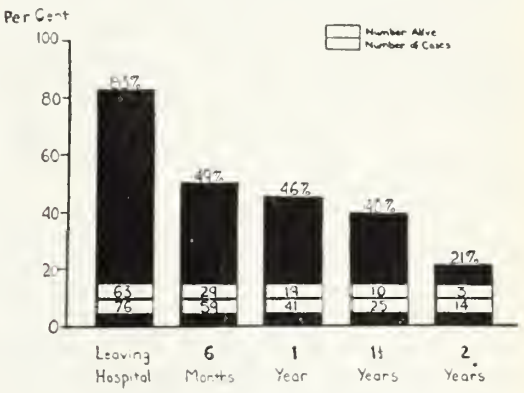

FIG. 5. SURVIVAL RATE AFTER RESECTION

pericardial resection had not been performed. Such dissection will obviously, therefore, increase the number of patients who leave the hospital with the tumor removed.

Finally, it is the small group of postoperative deaths with which the surgeon is most concerned. In our series, they represent seven per cent of the patients seen, and 17 per cent of those operated upon. We have included in this group all patients whose deaths were in any way related to the operative procedure. There are among these cases patients who left the hospital well but who returned later with a complication attributable to the operation.

Postoperative Deaths:

The 13 postoperative deaths may be grouped as follows: Five deaths can be attributed to

some error in technique. They include four deaths from hemorrhage, and one death from an uncontrolled tension pneumothorax. All these deaths are, of course, preventable. The majority occurred early in our series. An additional five deaths could be attributed to inadequate blood replacement or to prolonged hypoxia from the use of poor anesthetic methods. There were three deaths from miscellaneous causes which do not fall into either of the preceding categories. One patient died on the first post-operative day from massive hemorrhage from a ruptured spleen. One died on the second postoperative day from auricular fibrillation and cardiac failure, and one patient died 18 days after operation from an embolus to the femoral artery which necessitated amputation of the leg. It is obvious that there will always be some deaths of this character in major operations upon elderly patients. They represent, however, only a small proportion of the total deaths.

The challenge presented by the first two groups is of primary interest to those of us who are concerned with the surgical treatment of these patients. The deaths in the first group may be laid to inexperience. The second group, which concerns blood replacement and pulmonary ventilation, has concerned us during the past three years. The problem is to keep the patient in as nearly a normal physiological state as possible during and following the operative procedure. It is a fascinating problem and a great deal has been accomplished towards its solution although there is still great room for improvement. The disturbances created during the operation and in the postoperative course relate in general to all of the cardio-respiratory functions.

Reduction of Operative Mortality

Blood Volume:

The reduction of operative mortality depends upon a number of factors. One of these is the maintenance of a normal circulating blood volume.

All patients who are anemic should be given transfusions before operation. There are, however, certain chronically ill patients who have a reduced circulating blood volume which may or may not be accompanied by a lowered concentration of hemoglobin in the blood. The only method of detecting this lowered blood volume prior to operation is by a direct estimate of blood volume based on the determination of the hematocrit and the dilution of a dye, or a solution of radio-active iron, injected into the blood stream. Fortunately, most patients with carcinoma of the lung have been ill for only a short time. Thus the danger of operating on a patient with a blood volume below normal is less in carcinoma of the lung than it is, for example, in a patient with pulmonary tuberculosis.

It is obvious that, despite meticulous hemostasis, a certain amount of blood will be lost by a patient undergoing a major operative procedure. The magnitude of the loss was not appreciated until recent years when various methods of estimating the loss were devised. There are two general methods of making this estimation. The first consists of determining the blood volume immediately before and immediately after operation, and from the difference estimating the amount of blood lost during the operation. The second consists of actually determining how much blood escapes from the patient's blood vessels during the operation. This can be done by soaking all bloody sponges, linen, etc. in a known volume of water and then estimating the blood lost from the depth of color imparted to the water by the hemoglobin of the blood. A second easier and more accurate method is to determine the gain in weight of dry gauze sponges before and after they have been used to mop blood from the wound. This latter method was devised by Wangensteen (7) and has the additional advantage over the dilution and blood volume methods of affording information to the surgeon of the amount of blood lost at any time during the course of the operation. He may then regulate the transfusion of blood so that at any moment the amount of blood given the patient equals the amount lost. The ideal, of course, is to keep the blood volume constant

throughout the course of the operation. We have learned to our regret in the past not to depend on an increase in pulse rate, or a drop in blood pressure to indicate a decrease in blood volume. Too often there is no change in the pulse rate or blood pressure until there is a serious depletion of the blood volume at which time there may be a steady and progressive fall in the blood pressure and rise in the pulse rate, which is difficult to overcome even with rapid transfusion of blood.

For minor surgical procedures, or for major operations which do not entail the loss of significant amounts of blood, these accurate methods of determining blood loss, and thus the amount of blood that should be transfused, are unnecessary. Average figures of blood loss for the operation in question are sufficiently accurate. Minor degrees of over or under-replacement will be unimportant when considered in relation to the total blood volume. The importance of this factor when dealing with pneumonectomies for carcinoma of the lung (8) is indicated by an average blood loss of almost two liters, roughly 40 per cent of an adult's normal blood volume. Such a loss, if not replaced, will result in serious or fatal shock. This is an average figure; the loss may be as great as 70 per cent of the blood volume. The ideal, then, is not only to replace the blood loss volume for volume, but to do so as it is being lost. The only accurate method of accomplishing this at the present time is by weighing the bloody sponges used in the operation.

Excessive replacement of blood, which is certainly rarely met with, will, in a normal individual, throw an increased burden on the heart and produce generalized congestion of the vascular tree. Where the pulmonary vascular bed has been acutely reduced to approximately one-half of its normal volume, over-replacement of blood becomes a serious and important problem and may precipitate pulmonary edema in the remaining lung. We have observed this on rare occasions in human patients and have demonstrated in animals that a blood transfusion well tolerated by a normal animal may produce pulmonary edema and death in an animal where the pulmonary vascular bed has been acutely reduced to 30 per cent of its normal volume (9).

Mechanical Insufflation of the Lungs:

Another factor in the reduction of operative mortality is concerned with the maintenance of physiological proportions of oxygen and carbon dioxide in the alveolar air. This, to my mind, is one of the most fascinating problems of thoracic surgery. It is generally regarded as an anesthetic problem, but of course it really is not related to anesthesia in the sense of dulling or obliterating sensory perception. As the science of anesthesia developed in relation to surgery, it has enlarged to comprise not only the avoidance of painful sensation to the patient, but other functions such as the production of muscular relaxation in abdominal surgery to permit the surgeon to perform necessary technical procedures.

In thoracic surgery, even more is demanded of, or included in, the term "anesthesia." Successful major surgical operations within the thoracic cavity have a relatively short history. Progress is still being made in this field and operations of great magnitude and technical difficulties are being performed within the thorax which would have been impossible 20 years ago. These advances have been made possible in large part by the solution of the problem of maintaining normal aeration of the lungs with the thorax widely opened.

Let us consider the matter in the following way: first, the normal mechanics of respiration and composition of the gases in the arterial blood; second, the disturbances produced by widely opening one side of the thorax in man; and third, the restoration of approximately normal conditions while one or both sides of the thorax are widely opened during intrathoracic operations.

The following discussion is, of necessity, greatly simplified. Atmospheric air contains 79 per cent nitrogen, 21 per cent oxygen, and a fraction of 1 per cent carbon dioxide. Alveolar air has a different composition because the blood passing through the pulmonary capil-

laries gives off carbon dioxide and takes up oxygen. The alveolar air contains approximately 14 per cent oxygen and 5.5 per cent carbon dioxide, nitrogen 80 per cent, and is saturated with water vapor at body temperature. The tension of oxygen in alveolar air is approximately 100 mm. Hg. and that of carbon dioxide 40 mm. Hg. These are the same tensions that normally exist in arterial blood, as the blood which passes through the pulmonary capillaries reaches equilibrium with the alveolar air. The pressure mechanics of normal breathing are very simple and familiar to all of you. During inspiration, the size of the thoracic cavity increases, the pressure within the trachea and bronchi becomes somewhat less than atmospheric, and air rushes in through the open glottis until the alveolar pressure becomes atmospheric at the end of inspiration. With expiration, the size of the thoracic cavity decreases, the air pressure in the lung becomes slightly above atmospheric pressure, and air is expelled through the glottis until the pressure in the lungs, and the outside atmosphere, are again equal at the end of expiration.

When a wide opening is made into one pleural cavity, giving free communication to the atmospheric air, there is a marked disturbance of the normal relationships with a corresponding change in the composition and tension of the alveolar gases. If the opening is large, as it is in the ordinary intrathoracic operation, and there are no adhesions of the lung to the chest wall, the lung on the opened side of the chest will collapse. Air no longer passes back and forth through the glottis with respiratory movements, but will instead pass in and out through the open wound in the thorax and the patient soon will asphyxiate. The mediastinum shifts from side to side with the respiratory movements and no exchange of air can take place in the lung on the opposite side. Graham (10), as early as 1918, calculated that in a person who could increase his tidal air to 3500 cc. the largest opening in the chest compatible with life was 50 square cm., the area of the glottis being 2.25 square cm. Under these circumstances, asphyxiation could be warded off for a short time.

Operations within a widely opened chest are usually performed with the help of positive pressure applied to the gaseous mixture which is connected with the patient's trachea through a closed system, using soda lime in the system to absorb the carbon dioxide. This stabilizes the mediastinum to a great extent and prevents a marked shift to the unopened side on inspiration. In conjunction with a high percentage of oxygen in the rebreathing circuit, it permits the surgeon to operate with reasonable safety. However, the pendulum movement of air between the two lungs still occurs, and because of this fact, the exchange of gases between the lung and the rubber bag in the rebreathing circuit is not as great as it should be. Crafoord (11), some ten years ago, found that in prolonged operations of three or four hours with the chest widely opened, despite excessive respiratory movements on the part of the patient, carbon dioxide eventually began to accumulate in the alveolar air with resultant acidosis and harmful toxic effects upon the respiratory center.

Another disadvantage of this system is the fact that the patient has to expire against positive pressure. Anyone who has attempted to expire against a positive pressure of two or three cm. of water for any length of time will realize how exhausting this may be. The additional muscular exertion required to expire against positive pressure increases the consumption of oxygen and the formation of carbon dioxide—a highly undesirable effect.

In the face of these objectionable features of simple positive pressure breathing, it seems extraordinary that the simple method of intermittent insufflation of the lungs used for many years in the laboratory was not adapted to clinical use until very recently. The method consists of the intermittent insufflation of air or oxygen into the animal's trachea. With expiration, there is no resistance, and with inspiration, the lungs are adequately inflated. There is no necessity for muscular exertion on the part of the anesthetized animal. To Clar-

ence Crafoord, of Sweden, goes the credit of adopting this method of aerating the lungs of human patients during operations with an open thorax. He first reported its use in 1939 before the American Association for Thoracic Surgery in Los Angeles and demonstrated the anesthetic machine which he had developed (11). Possibly due to the interruption of the war, or for other reasons which are not clear to me, this type of aeration of the lung with an open thorax has not been adopted in this country, with the exception of Claude Beck and Frederick Mautz of Cleveland. They constructed a simpler machine than Crafoord's and reported on its use in 1941 (12). In 1942 clinical reports of the use of curare began to appear. This simplified the application of the method and did away with the necessity of producing apnea by overventilation to eliminate diaphragmatic activity. It also permitted a lighter plane of anesthesia during operation. With the exception of Mautz in Cleveland and Neuhoff in New York, who has been working with Mautz's apparatus, mechanical insufflation of the lungs has still not been adopted in this country for clinical use. However, a similar method has been used. It consists of the use of curare with light anesthesia and intermittent insufflation of the lungs by compression of the rubber anesthetic bag by the anesthetist's hand. This appears to me to be a poor substitute for the mechanical apparatus. It requires the constant attention of the anesthetist, frequently for many hours, and must, of necessity, interfere with other duties which have been properly relegated to the anesthetist, such as the recording of blood pressure, pulse rate, attention to the intravenous fluids, the color of the patient, and the depth of the anesthesia.

At Jefferson Hospital, we have recently obtained Mautz's apparatus, and have also imported from Stockholm Crafoord's anesthetic machine. The latter is the more perfect instrument and permits a very exact control of pressure and of the relative lengths of the inspiratory and expiratory phases. We have now used this rhythmical mechanical insufflation of the lungs in 50 operations with an open thorax. Since the introduction of these anesthetic machines at the Jefferson Hospital, no major intrathoracic procedure has been done with any other method. It was immediately obvious to everyone concerned that patients went through the operation in much better condition than they did with the older method. Studies are now in progress using an indwelling arterial needle, for the determination of the gas content and pH of the arterial blood. The data is being used to calibrate an improved oximeter designed by Miller. These studies will be reported at a later date.

With proper attention to the matters outlined above, I believe the outlook is very bright for a great reduction in the operative mortality in cancer of the lung in future years. I hope that the discussion of these factors with which I, as a surgeon, am intimately concerned, has not proved tiresome to those of you with other interests. My only excuse for discussing these matters is that I feel that I am more competent here than in other aspects of the problem. May I again point out that while we as surgeons are striving to increase the percentage of patients with cancer of the lung who leave the hospital alive after a radical operation, all of you who are concerned with the general practice of medicine have the far greater task of reducing the five months' delay in diagnosis after a patient consults a doctor. It is only by this means and this cooperation that more patients with cancer of the lung may be cured of their disease.

REFERENCES

1. Björk, V. O. Bronchiogenic Carcinoma. Acta Chir. Scandinav. 95, Suppl. 123, 1947.
2. Fried, B. M. Bronchogenic Carcinoma and Adenoma. Baltimore, Williams & Wilkins, 1948.
3. Ochsner, A., and DeBakey, M. Carcinoma of the lung, Arch. Surg. **42:** 209, 1941.
4. Ochsner, A., *et al.* Primary pulmonary malignancy, J. Thoracic Surg. **17:** 573, 1948.
5. Graham, E. A. Personal communication.
6. Healey, J. H., and Gibbon, J. H., Jr. Intra-

pericardial anatomy in relation to pneumonectomy (*to be published*).

7. Wangensteen, O. H. The controlled administration of fluid to surgical patients, Minnesota Med. **25:** 783, 1942.
8. Miller, B. J., Gibbon, J. H., Jr., and Allbritten, F. F. Blood volume and extracellular fluid changes during thoracic operations, J. Thoracic Surg. (*to be published*).
9. Gibbon, J. H., Jr., *et al.* Experimental pulmonary edema following lobectomy and blood transfusion, J. Thoracic Surg. **12:** 60, 1942.
10. Graham, E. A. The maximum nonfatal opening of the chest wall, J. A. M. A. **73:** 1934, 1919.
11. Crafoord, C. Pulmonary ventilation and anesthesia in major chest surgery, J. Thoracic Surg. **9:** 237, 1939–40.
12. Mautz, F. R., *et al.* Augmented and controlled breathing in transpleural operations, J. Thoracic Surg. **17:** 283, 1948.

Medical Education: The Past Century and the Future*

By VICTOR JOHNSON, M.D., PH.D.

Director, Mayo Foundation for Medical Education and Research, Rochester, Minnesota

THERE are few if any cities in the United States with as rich a heritage of political history as Philadelphia, few which may celebrate so many events of great moment to our country, from its earliest beginnings. In the sphere of science and medicine, the city likewise can record a distinguished past. It was here, nearly 200 years ago (in 1765), that a medical school known as the "College of Philadelphia" opened its doors. As the University of Pennsylvania School of Medicine, this institution continues today as the oldest medical college in the country. It need not be added that it is also among the most distinguished in education and research. Another milestone in American medicine was passed just over a century ago, when (in 1847) the American Medical Association was organized in this city. This historic occasion was followed but two years later by the formation of the Philadelphia County Medical Society, whose centenary is celebrated tonight.

From the very outset, the history of organized medicine has been in large measure the history of medical education. The call for the first national convention of physicians commenced with the assertion: "It is believed that a national convention would be conducive to the elevation of the standard of medical education in the United States (1)." One of the first acts of the Philadelphia meeting was the establishment of a Committee on Medical Education, whose first pronouncement read as follows: "This Association considers defective and erroneous every system of medical instruction which does not rest on the basis of practical demonstration and clinical teaching; . . . it is . . . the duty of the medical schools to resort to every honorable means to obtain access for their students to the wards of a well regulated hospital (2)."

Early Years

The lowly state of medical education at the time the Philadelphia County Medical Society was formed is reflected in the frequent resolutions, discussions and recommendations dealing with the subject, usually as the principal topic, at the annual sessions of the American Medical Association. For example, about a decade after the Association was formed, the Committee on Medical Education recommended that academic medical education should be encouraged. Yet the committee recognized that apprentice training would continue in volume for some time, and it urged, in the meantime, that physicians giving office instruction should provide for "demonstrations, illustrations and recitations," at the apprenticeship office, at a medical school or under a physician able to provide these "necessary advantages." It was recommended that the professorships should number not less than seven, in the fields of anatomy and microscopy, physiology and pathology, chemistry, surgery, practical medicine, obstetrics and materia medica. It was considered desirable to lengthen the school term to six months, commencing in October and running until March. A "liberal primary education" was urged as an admission requirement, and it was recommended that there be "attendance upon a course of clinical instruction in a regularly organized hospital (3)."

In a pioneer country, with a rapidly increas-

* Read before a joint meeting of the Philadelphia County Medical Society and the College of Physicians of Philadelphia, March 9, 1949, at the hundredth anniversary of the Philadelphia County Medical Society.

ing population and the continued westward migration, the demand for physicians, and therefore for medical schools, was great. There were virtually no legal restrictions on the establishment of medical schools. Many were decidedly inferior and were established primarily for the financial gain of the promoters and the faculty. The operation of a medical school was often a profitable enterprise, and there was an intense competition for students. Besides the so-called medical schools and the apprentice training in physicians' offices, there arose "diploma mills" in all sections of the country. These sold diplomas with no pretense whatsoever of providing medical training of any kind. There was nothing resembling uniformity in the curriculum. Depending upon the interests of the professors, the time devoted to a given subject varied widely from school to school: anatomy, 200 to 1,248 hours; bacteriology, 45 to 364 hours; pathology, 54 to 512 hours; surgery, 64 to 1,168 hours; medicine, 140 to 1,232 hours; and obstetrics, 67 to 320 hours. Admission requirements were usually nonexistent. Often the ability even to read and write was not essential (4).

To fashion order from this chaos appeared hopeless. After nearly a quarter century of operation (in 1872), the Committee on Medical Education, after enumerating the evils of medical education, said that "it seems much easier to show the defects in our present system than to advise a suitable and practical remedy (5)." Of that period, with its countless resolutions, Simmons has stated: "Of all the resolutions adopted, and there were hundreds of them, not one can be regarded as resulting in any specific good. Of all the correspondence with, and appeals to, medical colleges, and there was an abundance of both, not a solitary bit of evidence is there of any practical compliance (5)."

Today this harsh judgment seems unwarranted. It is scarcely correct to conclude that, in these early years, nothing was accomplished by the American Medical Association and its allies, the American Academy of Medicine, the Association of American Medical Colleges and the state licensing boards. One hundred years ago colleges were awarding the degree of Doctor of Medicine for less than six months' attendance in addition to a period of apprenticeship. Such a degree admitted the holder to the practice of medicine in almost every state. There were no admission standards worthy of mention. Sixty years later, a four-year course of at least six months each was required for the degree. In almost every state, this degree gave the graduate not the right to practice medicine, but to a licensure examination. A goodly number of schools exacted a high school diploma for admission and a few required two years of college.

The intangible effects of the repeated discussions and resolutions are hard to assess, but were undoubtedly important. Besides the specific, although modest, improvements in the medical course, public opinion was being molded, forces aimed at improvement were being mobilized, and the stage was prepared for the revolutionary changes of the first years of the twentieth century.

A Decade of Revolution

The decade from 1905 to 1914 witnessed in this country a veritable revolution in medical education, a transformation probably unequalled anywhere in any area of learning. It commenced with the formation by the American Medical Association of the permanent Council on Medical Education, and terminated with the entire scene of medical education redrawn. Taking stock at the outset, the new Council saw in the United States about as many schools as existed in the entire remainder of the world. Most were decidedly inferior to the schools of England, Germany and France. Many admitted students without high school education, and there were only five requiring two or more years of college premedical work. Academic standards were low, facilities and faculties inadequate, financial support was lacking, students were poorly prepared and failures in licensing examinations were many. With characteristic vigor Bevan stated: "It is evident from a study of the medical schools of

this country and their work that there are five especially rotten spots which are responsible for most of the bad medical instruction. They are: Illinois with fifteen schools, Missouri with fourteen . . . , Maryland with eight . . . , Kentucky with seven . . . and Tennessee with ten. . . . That is, fifty-four medical schools in these five states and not more than six of these can be considered acceptable (6)."

Under Bevan's leadership the Council established standards for admission and for a four-year medical course to be followed by a year of internship. The standards were published, and provided the means for a classification of schools based upon inspections of the institutions. Innumerable difficulties were encountered in carrying out the surveys. Bevan cited an illuminating illustration: "When we began our first inspection there were seven medical colleges in Louisville, Ky. I received a letter from one of my good friends in Louisville one day, telling me not to come to Louisville because all the medical schools had agreed not to allow themselves to be inspected by the Council. I wired at once that Dr. Colwell and I were leaving for Louisville that night and desired to inspect the schools the next day. With true Southern hospitality they received us and gave us every opportunity to inspect their schools. . . . We discussed the subject of consolidating all the medical schools of Louisville into one strong school, which might then secure the united support of the medical profession and the citizens of Louisville and secure the use of the Louisville Hospital as a hospital for teaching and research; this was finally agreed to and finally carried into effect, so that today Louisville has a single school much stronger than any of its predecessors and enjoys the benefit of excellent clinical material. The same story was repeated in many cities of the country (6)."

As a result of this report, which was not published, but was given the schools, "a great wave of improvement in medical education swept over the country."

In certain quarters, particularly in the poorer medical colleges, there developed a considerable resentment against the reports, so that the Council suggested to the Carnegie Foundation that it conduct a complete survey of the schools, and publish a report which "would . . . have the weight of an independent report of a disinterested body . . ." (7), although it was agreed that "the Foundation would be guided very largely by the Council's (previous) investigation." (7)

The Carnegie study was begun in 1908 by Drs. Abraham Flexner for the Carnegie Foundation for the Advancement of Teaching and N. P. Colwell of the Council and their results were published two years later in what is commonly known as "The Flexner Report (8)." The American Medical Association was greatly strengthened in its struggle to improve medical education by this report from a neutral educational foundation of high standing. The report criticized medical education in this country even more severely than had the unpublished reports of the Council, and strongly advocated extensive reforms.

These intensive efforts were reflected during the ensuing decade in a considerable reduction in the number of medical schools, effected by the closure of many weak schools and the merger of others into institutions much stronger than the component parts. As compared with the 160 medical colleges in 1905, the number was reduced to 95 in the following ten years, to 85 by 1920, and 80 by 1927.

These results are amazing, when it is recalled that the Council had no legal powers, but had to depend upon results through the establishment of confidence in the integrity and conclusions of the Council on the part of government bodies (chiefly the licensing agencies), the better schools, the profession and the public at large. This confidence was established because of the fairness of the Council's studies, the objectivity and disinterestedness of its approach, and the staunch support of the licensing boards, the Carnegie Foundation and the Association of American Medical Colleges.

The important role of the *Journal of the American Medical Association* in establishing the wide influence of the Council cannot be

overemphasized. It was largely through *Journal* publications of state licensure examination statistics in the early years of the century that a demand was created for a thorough overhauling of medical education. Subsequently, the wide dissemination of the Council's findings, classifications, policies and recommendations in *Journal* publications have been of inestimable value in making the Council's work an effective influence in the improvement of medical education.

When the results of the Council's early surveys began to take effect, and the number of medical schools decreased, considerable anxiety and even alarm were expressed in certain quarters. There was concern lest the diminution in numbers of schools would result in far fewer medical students being graduated and consequently an increasing dearth of physicians in the United States. This fear was felt in some instances by people having no interest in the perpetuation of low standards in medical schools. They were undoubtedly sincere in their concern. Subsequent events seemed to provide some justification for this alarm; however, the reduction in number of graduates proved to be only temporary. In the year 1905, when there were 160 medical schools, the graduates numbered 5,606. The year 1922 saw the low point in numbers of graduates. At that time there were 80 schools, just half the number operating seventeen years earlier, and there were 2,529 graduates—again about half the number graduating in 1905. Had this condition persisted there would undoubtedly have resulted a tremendous deficiency in physicians throughout the country, since considerably more than 2,500 physicians die every year.

But this low graduation rate did not persist. In the twenty years from 1922 until 1942 the number of medical schools was still further decreased to 77. Yet the number of graduates steadily increased, so that the number graduating in 1944 (5,163) was about double the number for 1922. In some instances the increased number of graduates from certain schools has not been justified by the equipment, facilities and faculties of the medical schools. On the whole, however, it is probable that most of this increase has been warranted, since schools rather generally were strengthened financially and otherwise throughout the past two decades to an extent which justified a larger student body and more graduates. Funds available to the schools have increased, faculties have been expanded and laboratory and clinical facilities augmented. This development has fully vindicated all the efforts that were expended to eliminate the poorer schools.

For two decades the number of physicians has increased more rapidly than has the population of the country. It is anticipated that this increment will continue, with the establishment of new medical colleges. Since the beginning of the war, entirely new medical schools or expansions of former schools of basic medical sciences to the full four-year status have been developed in Alabama, California (at Los Angeles), Winston-Salem, Dallas, Utah and the state of Washington. Others are contemplated in Florida, Mississippi, Missouri, North Carolina, West Virginia and elsewhere. There is now an annual increment (excess of graduates over deaths of physicians) of about 2,000 (9). This increment will increase with the evolutionary growth of medical schools, and will continue to exceed the annual increase in the population at large. The current rate of general population increase is about six people per 1,000 of the population per year.* The present rate of physician increase is about 10 physicians per 1,000 per year. Responsible medical educators will continue to encourage the formation of any new medical school which promises success, but will resist efforts at sudden ill-conceived expansion based upon alarmist pronouncements of existing and impending dire shortages of physicians.

Perhaps too much time has been devoted to

* Population estimated at 143,329,000 in 1948 and 153,375,000 in 1960; Bureau of the Census: Forecasts of the Population of the United States, by Age and Sex: 1945 to 2000. U. S. Department of Commerce. (Sept. 15) 1946, Series P-46, No. 7, 2 pp.

the story of the past of undergraduate medical education. This has been done deliberately for the following reason. Forty-five years ago, medical education presented problems of tremendous difficulty, directly affecting the health of the nation. Those problems, primarily of the quality of undergraduate medical education, were met with such eminent success as few would have predicted. They were solved by the medical profession, assisted by the better medical colleges, private foundations and the state licensing agencies. The latter were the only government bodies involved, except for certain state legislatures and municipalities. This unquestioned demonstration of high competence by physicians in adjusting to the health needs of the nation in the past warrants the people of the country resting great confidence in today's efforts by medicine to reach a solution to the extremely difficult problems now pressing upon our honored profession.

Graduate Training

It is not necessary to discuss in detail the development of internship and residency training, although the interest and efforts of the Council on Medical Education and Hospitals in the improvement of these phases of the training of physicians have continued for many years; today internship and residency problems employ far more funds and professional time of the American Medical Association than do the varied activities in the field of undergraduate medical education. The development of residency training programs and the American boards in the specialties of medicine is relatively recent history, familiar to all.

Specialty training has expanded at a staggering rate in the past few years. Early in the war everyone anticipated a tremendous increase in the postwar demand for residency training by physician veterans, many of whom participated in the accelerated medical school program and had their hospital training curtailed. During and since the war, the Council on Medical Education and Hospitals sought to stimulate, assist and co-ordinate the activities of various groups, organizations and institutions throughout the country seeking to meet these demands, while still preserving an acceptable quality of training. The demands have exceeded even the most extravagant estimates. In 1941 there were 5,256 approved residency positions. Today there are 15,172, three times the prewar number (10). With these large numbers of physicians in specialty training, and with unprecedented numbers desiring certification by the American boards, serious thought must be given to the question, "How many specialists in the various fields do we need in this country?"

The apparent simplicity of this question is misleading, since the complications are numerous. For example, what is the proper sphere of practice of the specialist in pediatrics, internal medicine, or obstetrics, as related to the general practitioner of medicine? Or, to what extent should anesthetics be given by physicians or specialists rather than qualified nurses? Furthermore, some specialists practice in more than one field: a neurologic surgeon usually does some neurology; a neurologist is likely to combine his work with psychiatry; and various combinations of ophthalmology and otolaryngology are common. Recognizing all these and other complicating factors, the author recently put this question to all members of all the American boards. Opinions expressed varied widely. Yet it was possible to formulate a rough first approximation to the possible number of specialists which might be required, from the opinions of more than 100 members of the various American boards, each expressing himself for his own specialty.

The total figure which resulted was 52,800 specialists in all fields possibly required for the best medical service to the people of this country (11). At the time this study was under way, the United States Public Health Service also sought to estimate the number of specialists required in this country by an entirely different approach. It applied the existing full-time specialist population in those twelve states of the country which are most

generously supplied with physicians, to the 1960 estimated population of the entire country. The figure for total specialists needed in 1960 was 56,299 (12). Since the 1960 population has been estimated at about 7 per cent more than that of 1948, it would seem fair to reduce the United States Public Health Service figure of 56,299 for 1960 to about 7 per cent less, or about 52,300 for 1948.

It could not have been anticipated that estimates of required specialists made by such different methods would yield results so similar: by the method of combining opinions of many specialists, it appears that nearly 53,000 specialists might be needed; by the method of extending the numbers of full-time specialists in the 12 best-supplied states to the entire country, it seems that more than 52,000 would be required.

What is the current specialist population available to meet this estimated need? Here again, approximations must suffice. Of the 31,498 specialists certified by the American boards to March 1, 1948 (13), perhaps about 29,000 are still alive. Adding to this figure the additional number of physicians who are not certified but limit their practice to a specialty (about 13,000) and a fraction (perhaps one third) of the 25,000 physicians who give special but not exclusive attention to a specialty (equivalent to about 8,000), we arrive at a total specialist manpower of about 50,000 now at work in this country. If only one third of the present 15,000 residents become specialists, the required number estimated will soon be exceeded, even allowing for deaths of specialists in the meantime. If the estimates of about 52,000 required specialists is an approximation to the truth, it may be that our present total specialist population approaches or equals the optimal number for the best medical care.

Thus it would appear that the present great volume of residency training should appreciably decrease in many fields. Indeed, it must decrease, unless 90 per cent of future medical graduates take three years of residency work in specialties, which is highly unlikely and equally highly undesirable. Furthermore, many of the residencies developed to meet immediate postwar needs are not of sufficiently high quality to warrant their continuation.

If we assume for the moment that about 52,000 specialists are needed and about the same number are now or will very soon become available, we should retain a sufficient number of the best residency programs to (1) replace losses by death and retirement, (2) possibly increase somewhat the total number, especially in certain fields, and (3) provide advanced education for qualified physicians from abroad who will return to their native countries, preferably in academic posts.

Even though we have addressed our attention, for the moment, to numbers, we must be equally concerned about the quality of residency training and the competence of the specialists we have counted. Many of the specialists in our computations are doubtless poorly qualified. In time these should be replaced. Our efforts should be directed toward improved quality of training while reducing the number of residency programs, except in certain special fields (such as anesthesiology and psychiatry), where manifest shortages of specialists exist.

Medical School Finances

Today the Achilles heel in the entire body of medical education, from college physics to American board certification, is the precarious state of medical school finances. All education is suffering from inadequate financial support, but the plight of the medical schools is particularly acute because undergraduate medical education is more expensive than that in any other field. The budgets for all medical and basic science schools in this country for the current academic year total about 51 million dollars, excluding research grants, special teaching grants and major costs of operating hospitals closely affiliated with medical schools. Just one fourth of this sum (12.8 million dollars) is derived from tuition. The remainder (more than 38 million dollars) is derived from

endowment income, gifts, grants, and appropriations from states and municipalities.* These sources cannot continue to supply such sums. Increased legislative appropriations are negated by rising costs, and endowment income is decreasing. Although state schools may have a somewhat less gloomy outlook than private schools, yet there is a universal and well-founded fear that the financial support of medical schools generally will become inadequate to maintain the existing high quality of undergraduate medical education, which is the foundation upon which our whole structure of superior medical care rests.

It has been estimated that the combined medical schools of the country need 15 million dollars annually from new sources merely to maintain the status quo. The new source most frequently mentioned is the federal government. Several measures providing federal aid have been introduced into Congress. Most medical schools and medical educators are concerned lest such aid would be secured only by a gradual but progressive relinquishing of that independence which has contributed so importantly to the achievement of a quality of medical education and research unequalled anywhere in the world.

There are two alternatives to federal aid, and only two. First, allow medical education to deteriorate, which alternative can only be rejected. Second, secure additional funds from other sources. Tuition increases cannot meet the needs, unless we frankly admit that medical schools are open only to the well-to-do. Greatly augmented support from state appropriations does not seem likely. In any case, this would not help the private schools, which include some of the best institutions, unless the states will be willing to appropriate funds to private institutions. A pattern for such support has already been set in Pennsylvania, which provides financial assistance to every medical school within its borders. Such a plan might also be developed on a regional basis, following the program of West Virginia, which contributes to the Medical College of Virginia, in which school a number of natives of West Virginia receive their clinical instruction.

Increased private giving still remains as a source of the required funds. Considerable thought and time and effort in important quarters are currently being directed toward a thorough exploration of this possibility. A provocative suggestion has been, for example, that a yearly gift of 100 dollars from each of 150,000 physicians would provide the 15 million dollars needed annually to save our medical schools. This is but one of many possible approaches.

* The figures employed in this section are those of Anderson and Tipner (13).

Conclusions

Our historical account of medical education in this country has carried us swiftly into the pressing medical problems of today. Many of these have not been mentioned, including that urgent question of the form of practice which will be followed by tomorrow's medical graduates, and all the rest of us. The scene we survey today in the broad area of medical care and its distribution is as troubled as that viewed in 1905 in the more limited field of undergraduate medical education. Now, as then, "it seems much easier to show the defects in our present system than to advise a suitable and practical remedy (5)." This is no time for rash promises that "a worker will get for himself and his dependents medical, dental, hospital and nursing care, [as well as] eyeglasses, hearing aids, cost of expensive medicine, etc." at a ridiculously low cost (14). Nor is this a time for timidity or undue adherence to tradition and custom. It is a time for such action as will enlist the continued wholehearted support of physicians everywhere.

We remember that the physicians of this country have demonstrated that they could transform undergraduate medical education from the worst in the world to the best in the world mainly within one decade. We remember that they could evolve a program of grad-

uate medical education unexcelled anywhere, and suddenly triple its size in an emergency. We remember that they could provide for the armed forces, essentially through their own organization, 60,000 physicians to give the best medical care received by any military establishment in history. We remember that this was accomplished while physicians were still maintaining and even improving the good health of the workers at home. We remember that the physicians and scientists of this country have achieved an understanding of man in health and an ability to control his diseases beyond the most optimistic hopes of yesterday.

This is the achievement of American medicine. These are the men and women—the physicians of this country, as individuals and as organized groups—who offer the greatest promise for still further improvement in the training of physicians and for a still broader distribution of the benefits they have to bestow upon mankind.

REFERENCES

1. Johnson, V. The Council on Medical Education and Hospitals. In: Fishbein, M. A History of the American Medical Association, 1847–1947. Phila., Saunders, 1947, pp. 887–922.
2. Stevens, A. H., *et al.* Report of the Committee on Education, Trans. A. M. A. **1:** 235–247, 1848.
3. Wood, J. R. Report of the Special Committee on Medical Education, Trans. A. M. A. **11:** 249–259, 1858.
4. Simmons, G. H. Medical Education and Preliminary Requirements, J. A. M. A. **42:** 1205–1210, 1904.
5. Simmons, G. H. What the American Medical Association Stands for, J. A. M. A. **49:** 1733–1740, 1907.
6. Bevan, A. D. Cooperation in Medical Education and Medical Service, J. A. M. A. **90:** 1173–1177, 1928.
7. Excerpts. Unpublished Minutes of the Meeting of the Council on Medical Education. New York, December, 1908.
8. Flexner, A. Medical Education in the United States and Canada . . . New York, Carnegie Foundation for the Advancement of Teaching, Bulletin no. 4, 1910.
9. Editorial: Deaths of Physicians in 1947, J. A. M. A. **136:** 252–253, 1948.
10. Arestad, F. H., *et al.* Approved Internships and Residencies in the United States. Annual Report on . . . by the Council on Medical Education and Hospitals of the American Medical Association, J. A. M. A. **137:** 23–28, 1948.
11. Johnson, V. Implications of Current Trends toward Specialization. In: Ashford, M.: Trends in Medical Education. New York, The Commonwealth Fund, 1949, pp. 173–178.
12. Perrott, G. St. J. Personal communication to the author.
13. Anderson, D. G., and Tipner, A. Medical Education in the United States and Canada. Forty-eighth Annual Report on . . . by the Council on Medical Education and Hospitals of the American Medical Association, J. A. M. A. **138:** 25–75, 1948.
14. Ewing, O. Town Meeting of the Air. Broadcast, Feb. 22, 1949.

Transactions of the Sections

SECTION ON GENERAL MEDICINE

29 January 1949

TRENDS IN CLINICAL CANCER RESEARCH. C. P. Rhoads*, M.D.

28 February 1949

BRILL'S DISEASE, WITH REPORT OF A CASE. Nathan Blumberg, M.D., and Laurence B. Weiss*, M.D. (Discussion opened by Joseph C. Doane, M.D.) (*Abstract 1, below*)

SIGNIFICANT EKG CHANGES ASSOCIATED WITH CHEST SURGERY. F. A. Erskine*, M.D., and S. M. Rauchwerger*, M.D. (Discussion opened by Thomas M. Durant, M.D.) (*Abstract 2, below*)

THE PROLONGED USE OF AN ORAL MERCURIAL DIURETIC IN THE TREATMENT OF CHRONIC CONGESTIVE HEART FAILURE. Joseph B. Vander Veer, M.D., Thomas W. Clark, M.D., and David S. Marshall, II*, M.D. (Discussion opened by Samuel Bellet, M.D.) (*Abstract 3, below*)

MECHANISM OF THE POST-GASTRECTOMY DUMPING SYNDROME. Thomas E. Machella, M.D. (Discussion opened by Henry J. Tumen, M.D.) (*Abstract 4, below*)

28 March 1949

HYPERSPLENISM AND SPLENECTOMY. Thomas Fitz-Hugh, Jr, M.D., and John W. Frost*, M.D. (Discussion opened by Leandro M. Tocantins, M.D.) (*Abstract 5, below*)

RESULTS OF MANAGEMENT OF DIABETIC COMPLICATIONS BY A DIABETIC TEAM. John B. Alexander*, M.D., Arthur H. Loomis*, M.D., and Charles T. Lee, jr*, M.D. (Discussion opened by Edward S. Dillon, M.D.) (*Abstract 6, below*)

THE USE OF RADIOSODIUM IN EVALUATING PERIPHERAL CIRCULATION AND THE EFFECTS OF VASODILATING DRUGS. Lawrence R. Rodgers*, M.D., Carl S. Nadler*, M.D., Frederick A. Robinson*, M.D., and Edward S. Dillon, M.D. (Discussion opened by Milton L. Cullen*, M.D.) (*Abstract 7, below*)

SARCOIDOSIS IN PHILADELPHIA, 1932–1948. Maurice Sones*, M.D., Harold L. Israel*, M.D., and Samuel C. Stein*, M.D. (Discussion opened by Edward D. DeLamater*, M.D.) (*Abstract 8, below*)

25 April 1949

Q FEVER IN A WOOL PROCESSING PLANT. O. Henry Janton*, M.D., and M. Michael Sigel*, PH.D. (Discussion opened by Amedeo Bondi*, PH.D.) (*Abstract 9, below*)

INTUBATION AS AN AID IN DIAGNOSIS OF GASTROINTESTINAL LESIONS. Stanley H. Lorber*, M.D. (Discussion opened by Henry J. Tumen, M.D.) (*Abstract 10, below*)

RAGWEED EXTERMINATION. George I. Blumstein*, M.D., and Jay Spiegelman*, M.D. (Discussion opened by Louis Tuft, M.D.)

ENZYMATIC PERITONITIS IN ACUTE PANCREATITIS. John M. Howard*, M.D. (Discussion opened by Thomas E. Machella, M.D.)

5 May 1949[1]

THE MECHANISM OF CONGESTIVE HEART FAILURE. Eugene A. Stead, jr*, M.D. (Discussers: William D. Stroud, M.D., and Isaac Starr, M.D.)

SECTION ON MEDICAL HISTORY

23 February 1949[2]

15 April 1949

THE PHILOSOPHICAL BASIS OF MEDICINE. Douglas Guthrie*, M.D.

SECTION ON OPHTHALMOLOGY[3]

20 January 1949

ABDUCENS PARALYSIS FROM BACILLUS ABORTUS INFECTION. Joseph C. Yaskin, M.D., and Russell S. Boles, M.D.

SENSITIVITY TO GOLD BALL IMPLANT: PRESENTA-

* By invitation.

[1] Joint meeting with the Philadelphia Heart Association, and the American College of Physicians' Postgraduate Course on Cardiovascular Disease.

[2] Joint meeting with the Section on Public Health, Preventive and Industrial Medicine. For program, see that of the same date under the Section on Public Health.

[3] The presentations at this Section are customarily abstracted in the *American Journal of Ophthalmology* and the *Archives of Ophthalmology*.

TION OF CASE. Walter H. Forster*, M.D., Robert F. Dickey*, M.D.

CONGENITAL LEVATOR-EXTERNAL RECTUS MUSCLE, PATHOLOGICAL ASSOCIATED REFLEX. Edmund B. Spaeth, M.D.

17 February 1949

RE-OPERATIONS IN GLAUCOMA. John H. Dunington*, M.D.

17 March 1949

TREATMENT OF GIANT FOLLICULAR LYMPHOMA WITH NITROGEN MUSTARD. Benjamin M. Chambers*, M.D.

GONIOTOMY IN THE TREATMENT OF CONGENITAL GLAUCOMA. Harold G. Scheie, M.D.

ENUCLEATION AND IMPLANTS. James S. Shipman, M.D., and Patrick J. Kennedy, M.D. (Discusser: P. Robb McDonald, M.D.)

21 April 1949

METASTATIC CARCINOMA OF THE EYE. James N. Greear*, M.D. (Discussers: Wilfred E. Fry, M.D., and John S. McGavic, M.D.)

SECTION ON OTOLARYNGOLOGY[4]

19 January 1949

OSTEITIS FIBROSA CYSTICA OF FRONTAL BONE: REPORT OF CASE. Philip A. Marden, M.D.

AN EXPERIMENTAL STUDY OF THE LOCAL USE OF GAMMA GLOBULIN IN THE TREATMENT OF THE COMMON COLD. W. J. Hitschler, M.D., Franklin L. Rutberg*, M.D., and Joseph Stokes, jr, M.D.

TUBERCULOUS LARYNGITIS AND TRACHEOBRONCHITIS. John J. O'Keefe, M.D.

[4] The presentations at this Section are customarily abstracted in the *Archives of Otolaryngology*.

16 February 1949

THE PRESENT DAY STATUS OF THE POLIOMYELITIS-TONSILLECTOMY ISSUE. Daniel S. Cunning*, M.D. (Discusser: Joseph C. Yaskin, M.D.)

16 March 1949[5]

27 April 1949

CARCINOMA OF THE EAR. Charles E. Towson, M.D., and William H. Shofstall*, M.D.

SIALOGRAPHY. F. Johnson Putney, M.D., and M. J. Shapiro*, M.D.

CAVERNOUS SINUS THROMBOPHLEBITIS—REVIEW OF THE RECENT LITERATURE AND REPORT OF A CASE. Will P. Pirkey*, M.D.

SECTION ON PUBLIC HEALTH, PREVENTIVE AND INDUSTRIAL MEDICINE

23 February 1949[6]

A CENTURY OF PROGRESS IN PUBLIC HEALTH. LOOKING BACKWARD. A. Parker Hitchens, M.D. LOOKING FORWARD. Henry F. Page, jr, M.D. (Discussion opened by Rufus S. Reeves, M.D.)

4 April 1949

THE MEDICAL DEPARTMENT OF THE MUNICIPAL COURT OF PHILADELPHIA AS AN ACCESSORY PUBLIC HEALTH SERVICE. E. J. G. Beardsley, M.D.

STEPS TOWARD WORLD HEALTH AND SECURITY. John H. Arnett, M.D.

25 May 1949

THE DONORA SMOG. Joseph Shilen*, M.D.

AIR POLLUTION CONTROL IN PHILADELPHIA. John Hodges*.

[5] Joint meeting, at the New York Academy of Medicine, with the Academy's Section on Otolaryngology. Discussions were opened by the following members of the College's Section: Harry P. Schenck, Louis E. Silcox, Karl M. Houser.

[6] Joint meeting with the Section on Medical History.

ABSTRACTS

Abstract 1

BRILL'S DISEASE, *with Report of a Case.* Nathan Blumberg, M.D., and Laurence B. Weiss, M.D.

It is of special importance in a large general hospital which draws patients from a foreign born population to consider Brill's disease as a cause of fever of undetermined origin.

A forty year old woman was admitted to the wards of the Jewish Hospital with a complaint of fever and headache. The temperature varied from 101° to 104° F. and was accompanied by fatigability, irritability, sweating and chills.

The patient migrated to America from Kiev, Russia in 1921 at the age of thirteen. She could not recall any previous febrile illness.

Physical examination revealed a well-developed, well nourished but dehydrated white female with a temperature of 103° F. and a few macular le-

sions ½ to 1½ centimeters in diameter over the upper abdomen and chest. A maculopapular rash over the upper extremities, sides of the abdomen, chest and back was noted on the second hospital day. Non-specific therapy was employed during the hospital stay and the temperature fell by crisis on the eleventh day of illness. The patient gradually regained strength and well-being.

Beginning on the ninth day of fever special studies were made to isolate the causative organism from the blood, sternal marrow, and buffy coat of white blood cells. Special colonies of lice were allowed to feed on the patient for varying periods and animal inoculations were then done. No rickettsia could be isolated.

The Weil-Felix reaction for proteus O X. 19 became positive 1:320 on the twelfth day and on the twenty-first day was positive 1:640. Confirmation tests indicated a far greater titer for epidemic typhus than for murine typhus. It is believed that this is a case of Brill's disease or recrudescent epidemic typhus.

Abstract 2

Significant EKG Changes Associated With Chest Surgery. F. A. Erskine, M.D., and S. M. Rauchwerger, M.D.

A correlation study was attempted between the clinical course and EKG changes in 112 patients who underwent major chest surgery at a 1,000 bed tuberculosis sanitorium at Oteen, North Carolina. This surgery included thoracoplasties, done in stages, excisional pulmonary surgery and extrapleural plombage. T-wave changes manifested by marked lowering (to less than 100 microvolts) or inversion of T_1 alone occurred in 18 cases, or over 16%, and a combination of lowered or inverted T_1 with similar changes in the T wave of Lead CF IV in 16 cases, or 14.3%. This in the complete absence of clinical evidence of organic heart disease. Arguments are proffered to refute the assumption of organic heart disease as the basis for these changes. It is believed these changes are brought about by positional changes of the heart, although unipolar leads were not available to support this belief. Emphasis is made that the occurrence of the above changes in the course of stage procedures is no contraindication to further surgery.

Abstract 3

The Prolonged Use of an Oral Mercurial Diuretic in the Treatment of Chronic Congestive Heart Failure. Joseph B. Vander Veer, M.D., Thomas W. Clark, M.D., and David S. Marshall, II, M.D.

CONCLUSIONS

1. An oral mercurial preparation has proved to be of clinical value as a diuretic when administered to ambulatory patients with congestive heart failure over a prolonged period of time.

2. The prolonged use of an oral mercurial diuretic decreases the need for parenteral mercury therapy and there is some evidence to suggest the incidence of hospitalization for cardiac reasons decreases.

3. No serious toxic manifestations were observed. In most instances, signs and symptoms suggesting toxicity subsided although the oral mercurial therapy was not discontinued.

4. No evidence to suggest progressive renal impairment occurred with the prolonged use of an oral mercurial preparation.

Abstract 4

Mechanism of the Post-Gastrectomy Dumping Syndrome. Thomas E. Machella, M.D.

In some patients following subtotal gastric resection, symptoms of varying severity occur after the ingestion of meals. These may consist of sweating, vertigo, palpitation, weakness, nausea and even collapse. It is generally accepted that the rapid entrance of food into the jejunum is somehow responsible for the manifestations. The mechanism of their production has been variously ascribed to mechanical distention of the jejunum, to hypoglycemia and also to hyperglycemia.

Observations on 16 patients manifesting symptoms of the "dumping syndrome" reveal that the symptoms occur toward the end of a mixed meal or immediately thereafter, during which time the blood sugar level is usually elevated. They are accompanied by a rise in blood pressure and an increase in pulse rate. The manifestations were reproduced by the administration of glucose and sucrose orally but not when glucose was administered intravenously. They were also reproduced in individuals with intact stomachs by the intrajejunal instillation of hypertonic solutions of glucose, sucrose, protein hydrolysate, sodium sulfate and magnesium sulfate, and by distention of the jejunum with an air-filled balloon.

It is felt that the early symptoms of the post-gastrectomy "dumping syndrome" are due to

distention of the jejunum by the fluid which enters the lumen of the gut in response to the presence of a hypertonic solution and not to distention by the mechanical presence of the food itself. They are not caused by hyperglycemia though a hyperglycemia may be present during the period of symptoms.

The symptoms may be prevented by the administration of atropine in physiologic doses before meals. They are not, however, prevented by bilateral vagotomy.

Abstract 5

HYPERSPLENISM AND SPLENECTOMY. Thomas Fitz-Hugh, jr, M.D., and John W. Frost, M.D. Hypersplenism is defined as an exaggeration of splenic function resulting in reduction of one or more of the circulating cellular elements of the blood. Primary hypersplenism refers to those which are "clinically" curable by splenectomy and includes: Idiopathic Thrombocytopenic Purpura, Familial Hemolytic Anemia, Splenic Panhematopenia, and Acquired Hemolytic Anemia. The secondary hypersplenism group comprises a number of diseases in which splenomegaly and panhematopenia are characteristic findings and in which splenectomy benefits the hematological defect. This group includes: "Banti's Syndrome", Gaucher's Disease, Lipoid Dystrophy, Sarcoidosis, Disseminated Lupus, and Tuberculosis of the Spleen. In any case of secondary hypersplenism the prognosis of the underlying disease itself must be weighed against the hazards and benefits of splenectomy.

Although some hematologists believe the diagnosis of hypersplenism is a simple problem of "correct addition", we find it often a meticulous affair with conflicting pieces of evidence to be weighed and with the final proof sometimes a matter of waiting for the "expected" post-splenectomy response.

Analysis of seventy-four splenectomies for hypersplenism shows a surgical mortality of 4% and a final mortality (overall) of 9% with an estimated score of 85% worthwhile results. Despite practical diagnostic difficulties and theoretical deficiencies in current hypersplenism concepts the good results of splenectomy justify the hypothesis and the procedure and warrant careful extension to certain serious borderline cases of "possible hypersplenism" of both primary and secondary types.

Abstract 6

RESULTS OF MANAGEMENT OF DIABETIC COMPLICATIONS BY A DIABETIC TEAM. John B. Alexander, M.D., Arthur H. Loomis, M.D., and Charles T. Lee, jr, M.D.

At the Pennsylvania Hospital, the care of all ward diabetic patients has recently been turned over to a team consisting of two staff members and one resident physician who are especially interested in diabetes. Results have appeared favorable, but it was thought worth while to analyse results of the first 231 cases managed by the team.

It was found that the cases under consideration made an ordinary group as regards age, sex, complications, operations, and causes of death. Deaths occurred in nine per cent of the patients, but diabetes as such was not a factor except possibly in one moribund individual in whom hypoglycemia occurred shortly before death.

Day by day control was studied by a percentage method and was found to become increasingly difficult as the basal insulin requirement increased. Two thirds of the cases were controlled sixty per cent or better by very strict criteria. Fever, surprisingly, was found not to affect unfavorably success of control.

It was concluded that a diabetic team makes possible an excellent quality of supervision of diabetic complications; and, in large measure, eliminates diabetes as a hazard in surgical and non-surgical complications.

Abstract 7

THE USE OF RADIOSODIUM IN EVALUATING PERIPHERAL CIRCULATION AND THE EFFECTS OF VASODILATING DRUGS. Lawrence R. Rodgers, M.D., Carl S. Nadler, M.D., Frederick A. Robinson, M.D., and Edward S. Dillon, M.D.

This preliminary report concerns the use of radiosodium both intravenously (Smith and Quimby) and intramuscularly (Kety) as an objective estimate of peripheral circulation. These tests are applied to patients with peripheral vascular disease before and after treatment with either intravenous diethyl ether (Katz method) or histidine-ascorbic acid (Wirtschafter and Widmann regime).

The intramuscular test is shown to be simpler, shorter and a more quantitative method of estimating peripheral circulation than the intravenous test.

Results of the tests tend to prove that, (1) diethyl ether and histidine-ascorbic acid increase

peripheral circulation, (2) the increase in circulation is greatest for a few hours immediately after administration of the drugs, and (3), the vasodilating effects are temporary and tend to confirm clinical findings that the drugs do not permanently increase circulation, but only while the drug is in actual use.

Abstract 8

Sarcoidosis in Philadelphia, (1932–1948). Maurice Sones, M.D., Harold L. Israel, M.D., and Samuel C. Stein, M.D.

The records of ninety-seven cases of sarcoidosis in the City of Philadelphia during the years 1932–1948, have been analyzed. Most of the major hospitals and clinics contributed cases to this series.

80.1% of the cases were Negroes and of these 85% were born in the South Atlantic States. 83.3% of the cases were in the age group, eleven to forty years. Females predominated in a ratio of 2:1.

The symptoms were occasionally severe, frequently minimal but, in no case, absent. Respiratory, dermatological, ocular symptoms and weight loss predominated. Involvement was detected by clinical and x-ray examination in the following order of frequency: chest, peripheral lymph nodes, skin, bones, spleen, liver, eyes and salivary glands.

The intracutaneous tuberculin test was negative in 65.8% of seventy-three cases. The plasma globulins were increased in 70.4% of fifty-four cases.

Duration of observation since original study has ranged as long as twelve years. The median duration of observation was fifteen months for the entire group; twenty-four months for the group that died. Fifteen deaths were reported in which the cause of death in five cases autopsied was sarcoidosis. Seven cases in the entire series developed pulmonary tuberculosis.

The preliminary analysis of the data reveals the following findings of special interest:

Sarcoidosis is not uncommon in Philadelphia as evidenced by the frequency with which it has been found in some of the hospitals and clinics.

The striking preponderance of cases whose place of birth is in the South Atlantic region suggests the possibility that the cause of sarcoidosis may be some infective agent common to that region.

The high mortality rate indicates that the seriousness of sarcoidosis has not been sufficiently stressed.

Abstract 9

Q Fever in a Wool Processing Plant. O. Henry Janton, M.D., and M. Michael Sigel, Ph.D.

The first serologically proved case of naturally acquired Q fever, in eastern United States was discovered in Philadelphia, February 1948. The patient was a worker in a wool processing plant which employed 186 workers, 37 of whom were absent from work during January, February, and March of 1948. It was suspected that these might have Q fever.

During July and September 1948, sera were obtained from the 37 workers who had been ill, and 115 others, allegedly not ill. Complement fixation tests were done on all sera, with the antigens of influenza A & B, psittacosis-lymphogranuloma viruses, and Q fever. Positive tests were obtained with the Q fever antigen only.

Titers ranging from 1:8 to 1:2048 were observed in 29 (78%) of the 37 ill which indicates serological evidence of having had recent contact with the *Rickettsia burneti*. Titers > 1:2 to 1:4 were noted in 8 (22%) of the 37. Thirty-one (27%) of the 115 allegedly not ill, had titers ranging from 1:8 to 1:1024. Eight (26%) of these 31 had titers from 1:128 to 1:1024, and suggest the possibility of inapparent illness of such a mild character that the worker did not consider himself ill. The titers below 1:128 might also indicate inapparent illness, or past infection.

It is felt that titers of 1:128 or higher, in single serum specimens, are diagnostic of present or recent infection with the *Rickettsia burneti*. A titer of 1:32 to 1:64 may also be indicative of infection. Titers of 1:8 to 1:16, in single specimens, are considered of doubtful diagnostic value of recent infection, but probably indicate past infection. The height of titers has no relationship to the severity or morbidity of the illness.

The signs and symptoms of those ill with Q fever were, in order of frequency: fever, sweats, chills or chilly sensations, malaise, sudden onset, headache and dry cough. A rash was not noted, nor was evidence of the infection in any of the contacts observed. The presence or absence of a pneumonitis cannot be stated, due to the absence of X-rays and the late period at which the study was carried out. Twenty-nine of the 37 ill workers, who were considered to have Q fever, were

absent from work on an average of 14 days. The 8 others were absent but 2 days.

Epidemiologic studies revealed that the *Rickettsia burneti* was present after December 31, 1947 and before April, 1948. The plant operations produced a great amount of dust. Employees who had Q fever were found in all working sections of the plant. The mode of infection in these patients is unknown. Possibly, this outbreak was caused by *R. burneti* inhaled by workers handling raw wool and goat hair during the last three weeks in January, 1948, and was presumably contained in dried ticks or tick feces in a dusty atmosphere.

Abstract 10

Intubation as an Aid in Diagnosis of Gastrointestinal Lesions. Stanley H. Lorber, M.D. The Miller-Abbott tube and its modifications enable us to localize, delineate or obtain cytological information of gastrointestinal lesions. Three groups of cases are presented in which intubation aided in the diagnosis of such lesions.

GROUP I: Cytological Examination of Esophageal Washings. A case is presented in which biopsy of an esophageal lesion was non-contributory. To obtain material from the lesion for cytological examination, a Miller-Abbot tube was used: the lower esophagus was obturated by inflation of the balloon and lavage was performed through the other lumen. The washings were found to contain malignant cells.

Group II: Delineation of Intestinal Lesions. In this group of intestinal lesions routine roentgenography provided indefinite diagnoses. To establish the diagnoses, the tube was introduced distal to the site of pathology and the intestine obturated by inflation of the balloon. Barium was then injected through the other lumen into the section of intestine proximal to the balloon. The lesions were clearly delineated by this method. (Four illustrative cases cited.)

GROUP III: Therapeutic and Diagnostic Intubation for Intestinal Obstruction. Patients with intestinal obstruction were intubated to obtain decompression. When the tube reached the area of obstruction, the balloon was deflated and barium injected through the other lumen to outline the lesion. (Three illustrative cases cited.)

Catalogue of the Mütter Museum of the College of Physicians of Philadelphia

Compiled by ELLA N. WADE, *Curator*

PART XII*

References to the Literature: Nos. 1–29
List of Donors: A 1–301
Subject Index

REFERENCES TO THE LITERATURE

1. Ashhurst, J., jr, *ed.*, International Encyclopaedia of Surgery, N.Y., 1881–1895. (a) vol. 4, p. 75, fig. 595; (b) vol. 4, p. 89, fig. 597; (c) vol. 4, p. 95, fig. 599.
2. *Phila. Med. Times.* (a) Müller, A. F., Specimen of greenstick fracture, 2: 294, 1871–2; (b) Harlan, G. C., Fatal otitis, 11: 750, 1880–81; (c) Dercum, F. X., Description of the brain of John M. Wilson, 17: 368, 1886–7; (d) Sinkler, W., A case of brain-tumor, 16: 395, 1885–6.
3. *Trans. Am. Surg. Assn.* (a) Roberts, J. B., (Case 2), 14: 614, 1896; (b) ——, (Case 1), *ibid.*, p. 612.
4. (a) Conklin, W. J., Impacted fracture of the neck of the femur, *Columbus Med. J.*, 1: 193 (197), 1882–3.
5. (a) Perforating gunshot fractures of the skull, in: Medical and Surgical History of the War of the Rebellion, First surgical vol., p. 206, Washington, 1875.
6. *Trans. Coll. Phys. Phila.* (a) Morris, J. C., United fracture of the skull of very old standing, n.s. 4: 219, 1863–1874; (b) Hunt, W., Remarkable case of co-existence of tetanus and paralysis, n.s. 3: 466, 1856–62; (c) Ashhurst, J., jr, Excision of the knee, n.s. 4: 413, 1863–74; (d) ——, ——, Case XI, Arthritis of left knee with necrosis of tibia, 3d s. 2:67, 1876; (e) Mears, J. E., Case of peripheral necrosis of the humerus, 3d s. 3:17, 1877 (f) Ashhurst, J., jr, Excision of the Knee, Case IX, Gelatinous arthritis in a child, 3d s. 2:65, 1876; (g) Corse, J. M., Intra-uterine hydrocephalus, n.s. 3:465, 1856–62; (h) Getchell, F. H., Case of monstrosity, n.s. 4:189, 1863–74; (i) Warrington, J., Skeleton of a double-bodied monster, n.s. 1:90, 171, 1850–53; (j) Neill, J., No. 21, Heart from a cyanosised boy, 3:29, 1849–50; (k) Parrish, I., No. 1, Calcareous rod across a semilunar valve of the aorta, 3:23, 1849–50; (l) Hinsdale, G., Case of foreign body in the larynx; death from suffocation, 3d s. 18:227, 1896; (m) Hartshorne, E., No. 44, Gangrene and perforation of the appendix vermiformis, n.s. 1:86, 1850–53; (n) Keller, W., No. 70, Degeneration of the liver, and hypertrophy of the gall-bladder, n.s. 1:118, 1850–53; (o) Pepper, W., Encephaloid tumor in mediastinum, pressing upon left lung, with cancer of the kidneys, n.s. 1:100, 1850–53; (p) Atlee, W. F., Operation for supposed ovarian tumor; removal of enlarged uterus, n.s. 4-387, 1863–74; (q) Allen, H., Report of an autopsy on the bodies of Chang and Eng Bunker, commonly known as the Siamese Twins, 3d s. 1:3, 1875, *and* Pancoast, W. H., Report of surgical considerations, *ibid.*, p. 149; (r) McFarland, J., Notes on the Mütter American giant, 4th s. 6:148, 1938–9; (s) Corse, J. M., Case of craniotomy, n.s. 3:195, 1856–62; (t–u) Mitchell, S. W., Cases illustrating local injuries of nerves and their trophic consequences, 3d s. 2:120, 122, 1876; (v) Wilson, J. C., Leprosy, 3d s. 16:130, 1894.

7a–8a. Hinsdale, G., Case of hyperostosis cranii, *J. Nerv. & Mental Dis.* 23:803, 1896.

9. Hirst, B. C., Text-book of Obstetrics. 8th ed. Phila., 1918. (a) p. 470; (b) p. 476; (c) p. 465; (d) p. 467; (e) p. 466; (f) p. 458; (g)

* Part I was published in the *Transactions & Studies of the College of Physicians of Philadelphia* 15: 74–89, June, 1947; Part II, 1, section 1, *ibid.* 15: 128–143, December, 1947; Part II, 1(section 2)-5, *ibid.* 16: 129–146, December, 1948; Parts III–XI, *ibid.* 17: 23–45, April, 1949. Reprints of the parts are obtainable from the Curator of the Mütter Museum.

LIBRARY OF THE
COLLEGE OF PHYSICIANS
OF PHILADELPHIA

p. 463; (h) p. 498; (i) p. 493; (j) p. 457; (k) p. 454; (l) p. 455; (m) p. 447.

10a–11a. Walsh, J. F., The skeleton of a rachitic woman, and skull of the fetus that had been removed from her by cesarian section, *Am. J. Obstetrics* 12:766, 1879.

12. *Trans.* (some volumes, *Proc.*) *Pathol. Soc. of Phila.* (a) Bache, T. H., Osteosarcoma of the head of the left tibia, 4:27, 1874; (b) Allen, H., On the structural changes in a specimen of flat-foot, 3:34, 1871; (c) Dulles, C. W., Enormous hypertrophy of the heart, 12:75, 1886; (d) Packard, J. H., Rupture of the heart, 3:43, 1871; (e) Keen, W. W., A case of rupture of the heart, and postmortem muscular spasms, 5:94, 1876; (f) Cohen, J. Solis-, Case of stenosis of the aortic valves, with extensive calcareous degeneration reaching nearly to the mitral valve, 8:64, 1879; (g) Cohen, J. Solis-, Case of circumscribed epithelioma of the larynx, *ibid.*, p. 82; (h) Tyson, J., Cancer of the pylorus simulating cancer of the pancreas, 4:88, 1874; (i) Mitchell, S. W., Fibroid thickening of pyloric half of stomach, 3:9, 1871; (j) Cleemann, R. A., Congenital imperforation of the duodenum and absence of the gallbladder, 5:38, 1876; (k) Mears, J. E., Rupture of the descending colon from external violence, 11:27, 1884; (l) Pepper, W., Extensive invagination of the ileum, caecum, and ascending and transverse colon, 4:50, 1874; (m) Packard, J. H., Single kidney, 2:99, 1867; (n) Mears, J. E., and Atlee, W. L., Large fibroid tumour of the uterus, 3:87, 1871; (o) Mears, J. E., Ovariotomy; bilocular cyst, 3:69, 1871; (p) Gross, F. H., Monstrosity. Case of malformation of the nose, 5:243, 1876; (q) Pepper, W., Extra-uterine pregnancy, 7:102, 1878; (r) Mitchell, S. W., Extensive encephaloid cancer of the subserous tissues of the peritoneum and pleura, 3:35, 1871; (s) Mitchell, S. W., Medullary cancer, 2:195, 1867.

13. (a) Keen, W. W. The Surgical Operations on President Cleveland. Phila., 1917.

14. *Trans. Am. Med. Assn.* (a) 29: pl. 5, fig. 1 & 2, 1878; (b) 29: pl. 4, fig. 2 & 3; pl. 5, fig. 3, 1878; (c) 29: pl. 3, fig. 4, 1878; (d) 29: pl. 3, fig. 3, 1878; (e) 29: pl. 5, fig. 4, 1878.

15. (a) Mears, J. E., Keen, W. W., Allen, H., and Pepper, W., A case of universal hyperostosis, associated with osteoporosis, with a description of the specimens, Proc. Am. Philos. Soc. 12:19, 1871–2.

16. (a) McGee, W. J., Primitive trephining, illustrated by the Muñiz Peruvian Collection, Bull. Johns Hopkins Hosp. 5:1, 1894.

17. (a) Edgar, J. C., The practice of Obstetrics. Phila., 1903, p. 678.

18. (a) Bright, Richard. Reports of Medical Cases. Vol. 2, pt. 1, p. 431 (Case CCV. Chronic hydrocephalus from childhood, in an adult), London, 1831.

19. (a) *Photographic Rev. of Med. & Surg.* 1:58, 1870–71.

20. *Am. J. Med. Sci.* (a) Mears, J. E., Description of an anomalous origin of the right subclavian artery, n.s. 62:401, 1871; (b) Atlee, J. L., Report of a case of strangulated hernia, complicated by a very extraordinary diseased spermatic cord, n.s. 85:117, 1883; (c) Atlee, W. L., Case 21, Ovariotomy, n.s. 29:391, 1855; (d) Taylor, W. T., Castration; recovery, followed by phthisis pulmonalis, n.s. 30:85, 1855; (e) Mears, J. E., Ovariotomy, n.s. 56:153, 1868; (f) Keen, W. W., Ovariotomy, n.s. 55:404, 407, 1868; (g) Atlee, W. L., Case 15, Ovariotomy, n.s. 29:390, 1855 (h) Hinsdale, G., Epilepsy from peripheral irritation, 97:587, 1889; (i) Wood, H. C., An expiscation of acute delirium, 109:361, 1895.

21. (a) Cohen, J. Solis-, A case of primary tuberculosis of the larynx, Arch. Laryng. 2:103, 1881.

22. (a) Packard, J. H., Case of epithelioma of the stomach and colon, presenting singular difficulty of diagnosis, Boston Med. & Surg. J. n.s. 110:371, 1884.

23. (a) Formad, H. F., A case of giant growth of the colon, University Med. Mag. 4:625, 1892.

24. (a) Luckhardt, A. B., Report of the autopsy of the Siamese twins, Surg., Gynec. & Obstet. 72:116, 1941.

25. (a) Roberts, J. B., Multiple cystomas of the liver treated by incision and evacuation, Ann. Surg. 19:251, 1894.

26. (a) Packard, F. R., Editorial:Siamese Twins, Ann. Med. Hist. 3d s. 3:448, 1941.

27. Hinsdale, G., Acromegaly. Phila., 1900.

28. (a) Harlan, G. C., Sarcoma of the lachrymal gland, Trans. Am. Ophth. Soc. 3:402, 1885.

29. Wood, H. C., jr, and Osol, A., Assay of a sample of opium ninety years old, Am. J. Pharmacy 111:380, 1939.

LIST OF DONORS

A
1. McClellan, George
2. Leidy, Joseph
3. Cottrell, J. E.
4. Hyrtl, Joseph
5. Rohn, J. V.
6. Logan, T. M.
7. Mears, J. Ewing
8. Mitchell, S. Weir
9. Wickersham, Morris S.
10. Richardson, J. P.
11. Hirst, Mrs. Barton C.
12. Brinton, John H.
13. Lloyd, Mrs. J. H.
14. Cryer, Mrs. Matthew H.
15. Mütter, T. D.
16. Halsey, W. S.
17. Bache, T. Hewson
18. Corse, J. M.
19. Roberts, A. S.
20. Drysdale, T. M.
21. Young, James K.
22. Cohen, J. Solis-
23. Hirsh, A. B.
24. Hinsdale, Guy
25. Paul, F. M.
26. Moore, Dr.
27. Atlee, W. L.
28. Nebinger, A.
29. Holcomb, R. C.
30. Longaker, Daniel
31. Price, Joseph
32. Griffith, J. P. C.
33. Ward, Charles H.
34. Krumbhaar, Edward B.
35. Robertson, W. E.
36. Hart, Charles D.
37. Roberts, John B.
38. College of Physicians of Philadelphia
39. Biddle, Thomas
40. Daland, Judson
41. Sappey, M.-P.-C.
42. Vasseur & Tramond
43. Tunis, J. P.
44. Schmidt, Henry D.
45. Politzer, Adam
46. Hunt, William
47. Allis, O. H.
48. Neill, John
49. Ashhurst, A. P. C.
50. Crossan, E. T.
51. Packard, John H.
52. Sharpless, I. T.
53. Keen, W. W.
54. Surgeon-General, U.S.A.
55. U. S. Base Hospital Unit No. 10., Pennsylvania Hospital
56. Forbes, W. S.
57. Larrey, D. J.
58. Morris, J. C.
59. Cloud, Joseph H.
60. Bridgett, Frank
61. Boardman, C. H.
62. Müller, A. F.
63. Ashhurst, John
64. Morton, T. S. K.
65. Townsend, R. H.
66. Porter, W. G.
67. Davis, G. G.
68. Herwirsch, Charles
69. Packard, F. R.
70. Weidman, Fred D.
71. Smith, H. H.
72. Harlan, George C.
73. Baker, Dr.
74. Frické, A.
75. Obstetrical Society of Philadelphia
76. Brown, R. E.
77. Gibson, Kasson G.
78. Sinkler, Wharton
79. Farr, Clifford B.
80. Kelly, W. S.
81. Randall, B. Alexander
82. Fraser, J. S.
83. Scott, Joseph
84. Harte, Richard H.
85. Willard, De Forest
86. Bryan, J. R.
87. Chance, Burton
88. Dulles, Charles W.
89. Keating, J. M.
90. Wurzel, E. K.
91. Getchell, F. H.
92. LeConte, Robert G.
93. Townsend, R. M.
94. Warrington, Joseph
95. Kerr, J. G.
96. Kelly, H. A.
97. Dorrance, George
98. Baum, Charles
99. Humberd, Charles D.
100. Eshner, A. A.
101. Philadelphia Hospital

102. Blockley, Charles Frazier
103. Parrish, Joseph
104. Packard, F. A.
105. Pepper, William
106. Smith, Francis G.
107. Parrish, Isaac
108. Allen, Harrison
109. Wharton, H. R.
110. Bertolet, R. M.
111. Bond, Henry
112. Hewson, Addinell
113. Tyson, James
114. McGuire, L. M.
115. Mitchell, J. K.
116. Cleemann, R. A.
117. Baldy, J. M.
118. Formad, Henry F.
119. Shober, Dr.
120. Price, Mordecai
121. Hartshorne, E.
122. Rodman, W. L.
123. Hall, A. D.
124. Osler, Sir William
125. Hand, F. C.
126. Williams, Horace
127. Wilson, C. M.
128. Norris, Isaac
129. Green, Traill
130. Taylor, W. J.
131. Musser, M. B.
132. Hughes, W. E.
133. Keller, W.
134. Stillé, Alfred
135. Ruschenberger, W. S. W.
136. Stewart, J. L.
137. Da Costa, J. M.
138. Hays, Isaac
139. Sutton, Stansbury
140. Horwitz, Orville
141. Atlee, John L.
142. Da Costa, J. C.
143. Noble, C. P.
144. Shoemaker, George E.
145. Parry, George R.
146. Goodell, W. C.
147. Werner, M. B.
148. Massey, G. B.
149. Slocum, Dr.
150. Hirst, B. C.
151. Penrose, C. B.
152. Redpath, N. J.
153. Brinkmann, L.
154. Morrison, William H.
155. Charlton, A. P.
156. Parvin, Theo.
157. Harris, R. P.
158. Brown, F. K.
159. American International Congress; Executive Committee
160. Dercum, Francis X.
161. Musser, John H.
162. Wood, H. C.
163. Beaus, S.
164. Ducachet, Dr.
165. Oliver, C. A.
166. Baer, Dr.
167. Connor, P. S.
168. Nancrede, G. B.
169. Wilson, J. C.
170. Fox, Herbert
171. Meigs, Arthur V.
172. Lyon, B. B. V.
173. Wainwright, J. M.
174. Gross, Mrs. S. W.
175. Wurts, C. S.
176. Leopold, Simon S.
177. Ziegler, Mrs. S. Lewis
178. Lewis, David
179. Leffmann, Henry
180. Schnabel, T. G.
181. Royal College of Surgeons, England
182. Leidy, Joseph, Jr.
183. Bradbury, Samuel
184. Methany, S. A. S.
185. Hays, Miss Henrietta
186. Risley, Mrs. Samuel B.
187. Hallowell, George W.
188. Senn, Nicholas
189. Radbill, Samuel X.
190, Samuel, Bernard, (*Mayor*)
191. Wilson, H. Augustus
192. Hughes, Donnell
193. Randolph, Dr.
194. Jackson, Chevalier
195. Atlee, Walter F.
196. Hull, J.
197. Warren, John Collins
198. Boyd, George M.
199. Simes, J. H. C.
200. Hardcastle, J. H.
201. Ludlow, Mrs. David Hunt
202. Evans, H. Y.

203. Talley, James E.
204. Sommers, G. N. J.
205. Rex, O. P.
206. Hodge, H. L.
207. Engham, H. M.
208. Van De Warker, Dr.
209. Van Harlingen, A.
210. Darrach, James
211. Pancoast, Joseph
212. Sartain, Paul J. (*est.*)
213. Bradley, William N.
214. Wilson, Ellwood
215. Coxe, Mary Clapier
216. Macfarlan, Douglas
217. Bowen, David
218. Posey, William C.
219. McGuire, Hunter H.
220. Wister, Owen
221. Norris, George W.
222. Norris, W. Fisher
223. Gould, Laura Stedman, (*est.*)
224. de Schweinitz, George E.
225. Lakin, H. Pearce
226. Talley, James E.
227. Norris, Charles C.
228. Van Cittert, P. H.
229. Pleasants, Henry
230. Longstreth, Morris, (*est.*)
231. Thomson, William
232. Zentmayer, William
233. Thorington, J. M.
234. McFarland, Joseph, (*est.*)
235. Brinton, Ward
236. McKelway, George I.
237. Jackson, Samuel
238. Bache, Franklin
239. Ashkenaz, David W.
240. Cohen, Myer Solis-
241. Morgan, A. C.
242. Allen, D. F.
243. Morris, Elliston J.
244. Ostheimer, Alfred
245. Gwynn, Norman
246. Loeb, Ludwig
247. Barton, James M.
248. Allen, Mrs. Harrison
249. Gross, Samuel W.
250. Bonney, Charles W.
251. Johnson, George B.
252. Judson, Mrs. Oliver
253. Ingham, J. V.
254. Hodge, Edward B.
255. Lloyd, Mrs. Susan W.
256. Weir, John H.
257. Chamberlain, W. E.
258. Lucké, Balduin
259. Trenner, Simeon
260. Rankin, C. R.
261. Miller, T. Grier
262. Fisher, H. M.
263. Carson, Miss Susan
264. Rosenberger, Randle C.
265. Westfield, Mrs. Peggy
266. Derby, Mrs. Mary Drysdale
267. Heller, Edwin C.
268. McKinney, Walter B.
269. Apple, W. Edson
270. Henry, Miss Josephine
271. Muir, Robert
272. Moon, Miss May
273. Mills, Charles K.
274. Taylor, Mrs. Frances Long
275. Smelzer, Donald C.
276. Hewson, William
277. Potts, Howard W.
278. Kane, J. A. Bayard
279. Super, Miss Carrie
280. Spiller, William G.
281. Reichert, Philip
282. Sutherland, Mr.
283. Duer, S. Naudain
284. Jenks, William F.
285. Hall, Rosetta Sherwood
286. Boone, H. W.
287. Owen, Hubley R.
288. Lewis, Mrs. Mable Potter
289. Collins, Walter Abbott
290. Fox, Mrs. Herbert
291. Ravdin, I. S.
292. Newcomet, William S.
293. Biddle, Mrs. Charles
294. Godlee, Sir Rickman
295. Stewart, Thomas S.
296. Walker, Miss Virginia
297. Frazer, John
298. Pepper, O. H. P.
299. Spiller, N.
300. Curie, Mme. Marie
301. Arnett, John H.

SUBJECT INDEX*

Abdomen, XV: 87
  cavities, XV: 87
  diseases, XVI: 136
  sections, XV: 87
Abnormalities
  arteries, XVI: 134, 135
  bones
    acquired, XVI: 129, 130
    congenital, XVI: 130, 131, 132, 133
    developmental, XVI: 131, 132
    from other causes, XVI: 132, 133
  bladder, XVI: 142
  brain, XVI: 135
  bronchi, XVI: 138
  ear, XVI: 144
  eye, XVI: 144
  glands, XVI: 145
  heart, XVI: 134
  intestines, XVI: 137
  kidney, XVI: 141
  larynx, XVI: 138
  monsters, XVI: 132, 133
  penis, XVI: 142
  photographs of, XVII: 44
  pregnancy, XVI: 142
  rectum, XVI: 137
  skin, XVI: 145
  stomach and spleen, XVI: 135, 137
  teeth, XVI: 130, 131
    of animals, XVII: 24
  testicle, XVI: 142
  uterus, XVI: 142
Abortion
  products, XVI: 142
Abscess(es)
  bones, XV: 140
    medullary, XV: 138
  brain, XVI: 135
  cornea, XVI: 143
  eyelid, XVI: 143
  lacrimal sac, XVI: 143
  larynx, XVI: 137
  liver, XVI: 137
  lungs, XVI: 138
  prostate gland, XVI: 139
  trachea, XVI: 138
  uterus, XVI: 140
Acetabulum (see under Articulations, hip-joint)
Acromegaly
  photographs, XVII: 44
  specimens, XVI: 133
Addison's Disease, XVI: 145
Adenocarcinoma (see under Tumors)
Adenoma (see under Tumors)
Adhesions
  heart, XVI: 134
  intestines, XVI: 137
  lungs, XVI: 138
  tympanic membrane, XVI: 144
Adipocere, XVII: 43
Alveolar (see Processes)
Amputations
  Chopart's, XVI: 133
  limbs, XVI: 133
  penis and testicle, XVI: 139
Anastomosis
  intestines, XVI: 136
Anencephalus, XVI: 132
Aneurisms
  arteries, XVI: 133, 134
  heart, XVI: 133
Angiosarcoma (see under Tumors)
Ankle
  amputations, XVI: 133
Ankyloblepharon, XVI: 143
Ankylosis, XV: 129, 130, 132, 134–142; XVI: 132, 144
Anthracosis, XVI: 138
Antrum (see under Sinuses, maxillary)
Appendix vermiformis
  diseases, XVI: 137
Arm (see also under Bones)
  gangrene, XVI: 146
Artery(ies)
  abnormalities, XVI: 134, 135
  axillary, XV: 84
  bronchial, XV: 84, 87
  diseases and local lesions, XVI: 134
  embryonic, XV: 84
  foot, XV: 84
  hand, XV: 84
  head, XV: 84
  injuries, XVI: 135
  intestinal tract, XV: 85
  liver, XV: 85, 87
  maxillary, XV: 85
  pulmonary, XV: 84
  skull, XV: 85

* Roman numerals refer to the volume, arabic numerals to the page, of the *Transactions & Studies*.

thorax, XV: 84
tongue, XV: 85, 86
vertebral column, XV: 85
Arthritis, XV: 137
tuberculous, XV: 137, 139, 141
Arthropathy, XV: 137
Articulations
ankle-joint
ankylosis, XV: 135, 138, 140
arthritis, XV: 137
arthropathy, XV: 137
deformity, XV: 132
exostosis, XV: 140
fracture, XV: 132, 135, 136
luxation, XV: 135, 136
necrosis, XV: 142
osteitis, XV: 138
elbow-joint, XV: 132
abnormalities, XVI: 132
ankylosis, XV: 129, 130, 134, 135, 137, 138, 140, 141
arthritis, XV: 137
caries, XV: 137, 141
deformity, XV: 135; XVI: 132
eburnation, XV: 137
fracture, XV: 134, 135, 136
hypertrophy, XV: 138
osteitis, XV: 138
hip-joint
ankylosis, XV: 137, 139, 140
arthritis, XV: 137
caries, XV: 141
coxitis, XV: 137
false-joint, XV: 136
fracture, XV: 134
luxation, XV: 136
tuberculosis, XV: 139
knee-joint, XV: 84
amputation, XVI: 133
ankylosis, XV: 137, 140
arthritis, XV: 137
arthropathy, XV: 137
caries, XV: 137, 141
eburnation, XV: 137
fractures, XV: 134, 135, 136
loose bodies, XV: 137
luxations, XV: 137
necrosis, XV: 137
osteitis, XV: 137
osteosarcoma, XV: 139
tuberculosis, XV: 141
metacarpophalangeal-joint
ankylosis, XV: 136
luxation, XVI: 136
sacro-iliac joint
ankylosis, XV: 140, 141
avulsion, XV: 136
exostosis, XV: 141
fracture, XV: 134, 136
shoulder-joint, XV: 82, 83, 84
ankylosis, XV: 140
arthritis, XV: 137
caries, XV: 141
eburnation, XV: 137
fractures, XV: 134, 135
ligaments, XV: 84
tarsometatarsal-joint
ankylosis, XV: 140
atrophy, XV: 140
wrist-joint, XV: 84
abnormalities, XVI: 132
ankylosis, XV: 134, 136, 137, 140
arthritis, XV: 137
deformity, XV: 136; XVI: 132
fractures, XV: 134, 136
osteosarcoma, XV: 139
Astragalus (see under Bones)
Atheroma
arteries, XVI: 133, 134
vales of heart, XVI: 133
Atlas (see under Bones)
Atrophy
bones, XV: 137, 140, 143; XVI: 130
stomach, XVI: 136
testicle, XVI: 139, 142
upper extremities, XVI: 131
Avulsion
finger, XVI: 144
foot, XVI: 144
sacro-iliac joint, XV: 136
thumb, XVI: 144
Axis (see under Bones)
Bicephalus, XVI: 132
Bladder
abnormalities, XVI: 142
diseases, XVI: 139
injuries, XVI: 142
lymphatics, XV: 85
Blepharitis, XVI: 143
Blepharoptosis, XVI: 143
Blood-Vascular System (see under Systems, blood-vascular)
Bones
abnormalities, XVI: 130, 131, 132, 133

acetabulum
deformity, XV: 137
fracture, XV: 130
animals (see Comparative Anatomy)
arm, XV: 82
abnormalities, XVI: 131, 132, 133
amputations, XVI: 133
deformity, XV: 134; XVI: 131
fracture, XV: 134
luxation, XV: 136
astragalus, XV: 84
ankylosis, XV: 135
caries, XV: 137
fracture, XV: 135, 136
luxation, XV: 137
necrosis, XV: 142
atlas, XV: 82
fracture, XV: 133
luxation, XV: 136
axis, XV: 82
fracture, XV: 133
calcaneum, XV: 84
fracture, XV: 135
calvarium, XV: 79
atrophy, XVI: 130
caries, XV: 140
exostosis, XV: 141, 142
hyperostosis, XV: 138, 142
osteitis deformans (Paget's Disease), XV: 138
osteitis (syphilitic), XV: 138
carpus, XV: 83
caries, XV: 141
fracture, XV: 134
luxation, XV: 136
necrosis, XV: 141
clavicle, XV: 82, 83, 84
abnormalities, XVI: 131
caries, XV: 129, 141
deformity, XV: 129
exostosis, XV: 141, 142
fracture, XV: 129, 134, 141
hyperostosis, XV: 142
necrosis, XV: 142
osteoporosis, XV: 142
sarcoma, XV: 139
syphilis, XV: 139
condyles
femur, XV: 83
humerus, XV: 82
mandible, XV: 80
variations, XV: 80
diseases, XV: 137, 138, 139, 140
ethmoid
fracture, XV: 133
face
deformity, XVI: 130
fracture, XV: 133
necrosis, XV: 142
syphilitic, XV: 142
feet, XV: 84 (see also under Feet)
ankylosis, XV: 140
arthritis, XV: 137
caries, XV: 138, 140, 141
osteitis, XV: 138
femur, XV: 82, 83, 84
abnormalities, XVI: 131
ankylosis, XV: 136, 140
arthritis, XV: 137
tuberculous, XV: 137
atrophy, XV: 137
caries, XV: 137, to 143
condyles, XV: 83
deformity, XV: 131, 137, 139, 132
eburnation, XV: 131, 136, 137, 142
exostosis, XV: 137, 138, 139, 141, 142, 143
fractures, XV: 130, 131, 133, 134, 138, 141, 142, 143
hyperostosis, XV: 142
hypertrophy, XV: 138, 139
luxation, XV: 136
necrosis, XV: 131, 142
osteitis, XV: 138, 139
osteomyelitis, XV: 138
osteoporosis, XV: 142
osteosarcoma, XV: 139
periostitis, XV: 138, 139
syphilitic, XV: 139
pressure necrosis, XV: 137, 143
rickets, XV: 139
tuberculosis, XV: 139
tumor, XV: 140
fibula, XV: 84
ankylosis, XV: 132, 138, 140
caries, XV: 141
deformity, XV: 132, 135, 139
exostosis, XV: 138, 139, 141
fracture, XV: 132, 133, 135, 136, 138
hyperostosis, XV: 142
hypertrophy, XV: 132, 138, 139
luxation, XV: 136
necrosis, XV: 139, 142
osteitis, XV: 138, 139
osteomyelitis, XV: 138
osteoporosis, XV: 142

osteosarcoma, XV: 139
periostitis, XV: 138, 139
rickets, XV: 139
fractures
single, XV: 128 to 132
multiple, XV: 132 to 136
frontal, XV: 79
caries, XV: 140
fracture, XV: 128, 133, 134
necrosis, XV: 142
grafted, XVI: 133
hand, XV: 82, 83
exostosis, XV: 141
humerus, XV: 82, 83, 84
abnormalities, XVI: 131, 132
arthritis, XV: 137
atrophy, XV: 137, 140, 143
cancer (scirrhus), secondary, XV: 140
caries, XV: 138, 139, 141
condyles, XV: 82
deformity, XV: 129, 130
eburnation, XV: 129, 137, 143
exostosis, XV: 137, 141
fractures, XV: 129, 130, 134, 136, 140, 142, 143
hyperostosis, XV: 142
hypertrophy, XV: 138
luxation, XV: 136
necrosis, XV: 130, 138, 139, 141, 142
osteitis, XV: 138, 139
osteoporosis, XV: 142
osteosarcoma, XV: 139
periostitis, XV: 138, 139
pressure necrosis, XV: 143
ilium, XV: 82, 83
fractures, XV: 130, 134
hyperostosis, XV: 142
osteoporosis, XV: 142
innominate, XV: 82, 83, 84
arthritis, XV: 137
caries, XV: 141
coxitis, XV: 137
eburnation, XV: 137, 141
exostosis, XV: 137, 141
fractures, XV: 130, 134, 141
osteosarcoma, XV: 139
ischii, fracture, XV: 130
leg, XV: 83, 84
amputations, XVI: 133
deformity, XV: 130, 134; XVI: 132
fracture, XV: 130, 134
luxation, XV: 136, 137
malar bone
fracture, XV: 128, 133
necrosis, XV: 142
malleolus, outer, fracture, XV: 135, 136
mandible, XV: 79
abnormalities, XVI: 130
cancrum oris, XV: 138
caries, XV: 140
condyles, XV: 80
cysts, XV: 141
development, XV: 79
eburnation, XV: 141
fractures, XV: 129, 133, 136, 142
luxation, XV: 136
necrosis, XV: 142
osteitis, XV: 138
osteosclerosis, XV: 142
tumor, XV: 140
variations, XV: 79, 80
manubrium, sterni
pressure necrosis, XV: 143
maxilla, XV: 80
arteries, XV: 85
atrophy, XV: 140
cancrum oris, XV: 138
caries, XV: 140
cysts, XV: 141
development, XV: 80
exostosis, XV: 141
fracture, XV: 133
necrosis, XV: 142
pressure necrosis, XV: 142
metacarpals, XV: 83
arthritis, XV: 137
fracture, XV: 134
luxation, XV: 136
osteitis, XV: 138
metatarsals
caries, XV: 135
deformity, XV: 135
exostosis, XV: 141
fracture, XV: 135
osteitis, XV: 138
rarefaction, XV: 143
nasal
atrophy, XV: 140
fracture, XV: 128, 133, 140
occipital, XV: 80
fracture, XV: 128, 133
orbit
fracture, XV: 133
necrosis, XV: 142

palate, hyperostosis, XV: 142
parietal, XV: 80
exostosis, XV: 141
fracture, XV: 128, 133
patella, XV: 84
ankylosis, XV: 140
caries, XV: 140
fracture, XV: 132, 135
hyperostosis, XV: 142
osteoporosis, XV: 142
pathological changes, XV: 140 to 143
pelvis, XV: 82, 83, 84
abnormalities, XVI: 131
ankylosis, XV: 137, 141
arthritis, XV: 137
deformity, XV: 139; XVI: 131
exostosis, XV: 141
fracture, XV: 130, 134
osteomalacia, XV: 138
rickets, XV: 139
tuberculosis, XV: 139
phalanages, XV: 83
amputation, XVI: 133
ankylosis, XV: 130, 140
atrophy, XV: 140
caries, XV: 141
fracture, XV: 130, 134
hyperostosis, XV: 142
osteoporosis, XV: 142
pubis, fracture, XV: 130
radius, XV: 82, 83
ankylosis, XV: 130, 136, 140
arthritis, XV: 137
atrophy, XV: 137, 140
caries, XV: 139, 141, 142
deformity, XV: 134
exostosis, XV: 137, 141, 142
fracture, XV: 130, 134, 136, 140
hyperostosis, XV: 142
hypertrophy, XV: 138
luxation, XV: 136
necrosis, XV: 141, 142
osteoporosis, XV: 142
periostitis, XV: 139
ribs, XV: 82
ankylosis XV: 140
deformity, XV: 129
exostosis, XV: 141
fracture, XV: 129, 134, 141
hyperostosis, XV: 142
necrosis, XV: 142
osteitis, XV: 138
synostosis, XVI: 131
tuberculosis, XV: 139
sacrum, XV: 82, 83
abnormalities, XVI: 131
ankylosis, XV: 140
caries, XV: 140, 141
deformity, XV: 130
fracture, XV: 130, 134, 143
pressure necrosis, XV: 143
scaphoid
fracture, XV: 135
scapula, XV: 82, 83, 84
abnormalities, XVI: 130, 131
arthritis, XV: 137
caries, XV: 141
exostosis, XV: 141
fenestration, XV: 142
fracture, XV: 129
hyperostosis, XV: 142
necrosis, XV: 142
osteoporosis, XV: 142
skeleton, XV: 76
abnormalities, XVI: 129, 132, 133
ankylosis, XV: 140
caries, XV: 140
deformity, XV: 139, 140
development, XV: 76
exostosis, XV: 141
rickets, XV: 139
skull (see also Skull), XV: 79, 80, 81
abnormalities, XVI: 130
abscess, XV: 140
arteries, XV: 85
caries, XV: 140
deformity, XV: 139
exostosis, XV: 141
fracture, XV: 128, 132, 133
osteomyelitis, XV: 138
rickets, XV: 139
sphenoid bone, XV: 80
caries, XV: 140
fracture, XV: 133
hypertrophy, XV: 138
necrosis, XV: 142
osteitis, XV: 138
syphilis, XV: 132, 138, 139, 141, 142
sternum, XV: 82
abnormalities, XVI: 131
caries, XV: 140
fracture, XV: 129
pressure necrosis, XV: 142
surgical lesions (healed) XVI: 133

tarsometatarsus
atrophy, XV: 140
tarsus
fracture, XV: 135
synostosis, XVI: 132
temporal, XV: 80
caries, XV: 140
exostosis, XV: 141
fracture, XV: 128, 133
necrosis, XV: 142
sarcoma, XV: 140
thorax, XV: 82
thumb
caries, XV: 141
tibia, XV: 84
abnormalities, XVI: 131
abscess, XV: 138
ankylosis, XV: 132, 138, 140
arthritis, XV: 137
atrophy, XV: 140
caries, XV: 132, 137, 138, 140, 141, 142
deformity, XV: 132, 135, 139
exostosis, XV: 138, 139, 141
fracture, XV: 132, 134, 135, 136, 138
hyperostosis, XV: 142
hypertrophy, XV: 138, 139
necrosis, XV: 139, 142
osteitis, XV: 132, 138, 139
osteomyelitis, XV: 138
osteoporosis, XV: 142
osteosarcoma, XV: 139
periostitis, XV: 132, 138, 139
rickets, XV: 139
syphilis, XV: 132, 139
toe
exostosis, XV: 141
ulna, XV: 82, 83
ankylosis, XV: 130
arthritis, XV: 137
caries, XV: 137, 139, 141
deformity, XV: 134
exostosis, XV: 137, 138
fracture, XV: 130, 134, 135
hyperostosis, XV: 142
hypertrophy, XV: 138
luxation, XV: 136
necrosis, XV: 141
osteitis, XV: 138
osteoporosis, XV: 142
periostitis, XV: 139
vertebrae, XV: 82, 83
abnormalities, XVI: 130, 131
ankylosis, XV: 139, 140, 141, 142, XVI: 132
atrophy, XV: 140
caries, XV: 140, 141
cervical, XV: 82
deformity, XV: 139, 140, 142
exostosis, XV: 140, 141, 142
fracture, XV: 129, 130, 133, 134
hyperostosis, XV: 142
lumbar, XV: 82, 83
necrosis, XV: 142
osteoporosis, XV: 142
synostosis, XVI: 131
thoracic, XV: 82, 83
tuberculosis, XV: 139
vomer
fracture, XV: 133
necrosis, XV: 142
zygomatic process
fracture, XV: 133
Bone graft, XVI: 133
Brachycephalus, XVI: 130
Brain, XV: 85
abnormalities, XVI: 135
diseases, XVI: 135
cerebellum, XV: 85, 86
choroid plexus, XV: 85
epileptics, XVI: 135
hemorrhage, XVI: 135
injuries, XVI: 135
medulla oblongata, XV: 85, 86
nerves, XV: 85
sections, XV: 85
stems, XV: 85
ventricles, XV: 85
Bronchopneumonia
lung specimen, XVI: 138
Bronchus, XV: 87
Buttock
osteosarcoma, XV: 139
tumor, XVI: 146

Calcification
aortic valves, XVI: 134
tympanic membrane, XVI: 144
Calculi, XVII: 25, 26, 27
biliary, XVII: 25
hepatic, XVII: 26
renal, XVI: 138; XVII: 26
intestinal, XVI: 137; XVII: 26
salivary, XVII: 26
urethral, XVII: 26
urethro-vesical, XVII: 26

uterine, XVII: 26
vesical, XVII: 26, 27
Calvarium (see under Bones)
Canal(s)
auditory
abnormalities, XVI: 144
Fontana
lymphatics, XV: 85
mandibular, XV: 80
vertebral
abnormalities, XVI: 130, 131
Cancer (see under Tumors)
Cancrum Oris, XV: 138
Carcinoma (see under Tumors)
Caries, XV: 129, 132, 135, 137, 138 to 143
syphylitic, XV: 141
Carpus (see under Bones)
Cataract, XVI: 143
Cauda equina, XV: 86
Cavities
abdominal, XV: 87
lymphatics, XV: 85
veins, XV: 85
nasal, XV: 81, 86
lymphatics, XV: 85
variations, XV: 87
thoracic, XV: 87
lymphatics, XV: 85
veins, XV: 85
Cells
ethmoid, XV: 80, 81
mastoid, XV: 80
Cellulitis, XVI: 144
Cephalothoracopagus, XVI: 133
Cerebellum, (see under Brain)
Cervical vertebrae (see under Bones)
Cervix, uterine, XV: 87
injury, XVI: 141
Cholera (see under Intestines)
Chorionic villi, XV: 88
Cirrhosis, XVI: 137
Clavicle (see under Bones)
Clubfoot (see Talipes)
Colitis, XVI: 136
Collapse
cornea, XVI: 143
lung, XVI: 138
Collections
Cryer, Matthew H.
sinuses, XV: 79, 80, 81
skulls, XV: 76, 77
teeth, XV: 86
Fraser, J. S.
lantern slides on ear, XVII: 42
Hewson, Addinell
lantern slides on obstruction in bronchus, XVII: 42
Hyrtl, Joseph
corrosions, XV: 84, 85, 87, 88
ossicles and labyrinths of ear, XV: 88, 89
skulls, XV: 77, 78, 79
Jackson, Chevalier
foreign bodies, XVII: 27
Lyon, B. B. Vincent
lantern slides on duodenal tube drainage, XVII: 42
Muñiz, Manuel Antonio
primitive trephined skulls, XVI: 133
Politzer, Adam
tympanic membranes, XV: 88
Randall, B. Alexander
lantern slides on eye and ear, XVII: 42
Tunis, J. P.
head sections, XV: 85; XVII: 42
Wilson, H. Augustus
shoes, XVII: 43, 44
Column, vertebral, XV: 82, 85
abnormalities, XVI: 131, 132
arteries, XV: 85
curvature, XVI: 133
lymphatics, XV: 85
veins, XV: 85
Comparative Anatomy, XVII: 23, 24, 25
animals
anomalies, XVII: 24
bones
normal, XVII: 24
pathological, XVII: 24
embryology, XVII: 25
internal anatomy
normal, XVII: 25
pathological, XVII: 25
Condyles (see under Bones)
Conjunctivitis, XVI: 143
Coxalgia (see under Tuberculosis)
Coxitis, XV: 137
Cranioschisis, XVI: 133
Cryptorchism, XVI: 142
Curvatures, XVI: 132, 133
Cyanosis (congenital), XVI: 134
Cyclitis, XVI: 144
Cystitis, XVI: 139
Cystoma (see under Tumors)
Cysts (see under Tumors)

Deformities
bones, XV: 129, 130, 131, 132, 134, 135, 136 137, 139, 140, 142; XVI: 131, 132, 133
lower extremities, XVI: 130, 131, 132
upper extremities, XVI: 131, 132, 133
Degeneration
calcareous
aorta and valves, XVI: 134
bladder, XVI: 139
choroid, XVI: 143
thyroid gland, XVI: 145
uterus, XVI: 141
cellular
liver, XVI: 137
fatty
heart, XVI: 134
senile
cornea, XVI: 143
Development
embryo, XV: 88
fetus, XV: 88
mandible, XV: 79
maxilla, XV: 80
skeleton, XV: 76
teeth, XV: 79, 80, 86
Diaphragm
cancer, secondary, XVI: 144
Digestive System (see System, Digestive)
Diseases of Animals (see Comparative Anatomy)
Ducts
cystic, XV: 87
lacrimal, spirals, XV: 88
Wirsung, XV: 87

Ear, XV: 88, 89
abnormalities, XVI: 131, 144
diseases and local lesions, XV: 140; XVI: 144
labyrinths, XV: 89
lymphatics, XV: 85, 88
ossicles, XV: 88
tympanic membrane, XV: 88
Eburnation, XV: 129, 131, 136, 137, 141, 142, 143
Ecchymosis
eyelid, XVI: 143
Ectropion, XVI: 143
Edema
glottis, XVI: 138
larynx, XVI: 137
scrotum, XVI: 139
Elephantiasis
leg, XVI: 135
Embolism, XVI: 138
Embryo
arteries, XV: 84
development, XV: 88
membranes, XV: 88
Encephalitis, XVI: 135
Encephalocele, XVI: 133, 135
Enchondroma (see under Tumors)
Endarteritis, XVI: 134
Endocarditis, XVI: 134
Enstrophe, XVI: 143
Epicanthus, XVI: 143, 144
Epiglottis
lymphatics, XV: 85
ulceration, XVI: 135, 137
Epiphysis
non-union, XV: 83, 84; XVI: 131
separation, XV: 130, 131, 132, 135, 142; XVI: 131
artificial, XV: 130, 133
Epileptics
brains, XVI: 135
Episcleritis, XVI: 143
Epithelioma (see under Tumors)
Epulis, XV: 139
Esophagus
diseases and local lesions, XVI: 136
Ethmocephalus, XVI: 133
Exophthalmos, XVI: 143
Exostosis, XV: 137 to 143
Experimental Surgery, XVI: 136
Exstrophy
bladder, XVI: 142
Eye, XV: 88
abnormalities, XVI: 144
diseases and local lesions, XVI: 142, 143, 144
injuries, XVI: 144

False-joint
hip, XV: 136
Fatty kidney, XVI: 138
Fauces
lymphatics, XV: 85
Feet (see also under Bones)
acromegaly, XVI: 133
arteries, XV: 84
deformity, XVI: 130, 132
gangrene, XVI: 146
lymphatics, XV: 85
Femur (see under Bones)
Fenestration
scapula, XV: 142

Fetus, XV: 88; XVI: 141
abnormalities, XVI: 132, 133
abnormal pregnancy, XVI: 142
deformity, XVI: 131
development, XV: 88
delivered by craniotomy, XVI: 141
diseases, XVI: 146
membranes, XV: 88
skeleton, XV: 76
Fibroma (see under Tumors)
Fibromyoma (see under Tumors)
Fibrosarcoma (see under Tumors)
Fibula (see under Bones)
Fistula
gastrocolic, XVI: 136
lacrimal sac, XVI: 143
retrovaginal, XVI: 141
urethroperineal, XVI: 139
Folds
arytenoepiglottidean
lymphatics, XV: 85
Follicles, of hair, XV: 89
Foreign bodies
removed from bladder, XVI: 139; XVII: 27
removed from lungs and bronchus, XVII: 27
removed from trachea, XVI: 138
Fossa
mandibular, XV: 79
submaxillary, XV: 80
Fractures of animal bones (see Comparative Anatomy)
Fractures
artificial, XV: 128, 129, 134
Barton's, XV: 130
butterfly, XV: 131, 132, 134
Colles', XV: 130
comminuted, XV: 128 to 136
complete, XV: 131, 132, 135
compound, XV: 128, 131, 134, 135, 136
crescentric, XV: 133
crushed, XV: 129, 136
depressed, XV: 128, 129, 133
double, XV: 129, 130, 132, 135, 136
fissured, XV: 128, 129, 130, 131, 133, 134
greenstick, XV: 135
grooved, XV: 131
gunshot, XV: 128 to 136
gutter, XV: 130, 131, 132, 136
mpacted, XV: 129, 130, 131, 133
intrauterine, XV: 135
with ligamentous union, XV: 132
linear, XV: 136
multiple, XV: 132 to 137
oblique, XV: 129 to 136
perforating, XV: 128, 132, 133
Pott's, XV: 135
punctured, XV: 128, 133
radiating, XV: 128, 132, 133
single, XV: 128 to 132
specimens, 128 to 136; 138, 140, 141, 142, 143
Frontal (see under Bones and Sinuses)

Gallbladder
diseases and local lesions, XVI: 137
Gall stones, XVI: 137
Gangrene
appendix vermiformis, XVI: 137
dry, XVI: 146
eyelid, XVI: 143
extremities, XVI: 146
moist, XVI: 146
Gastroschisis, XVI: 133
Gigantism, XVI: 133
photographs, XVII: 44
Glands
anomalies
pituitary, XVI: 145
diseases
adrenal, XVI: 145
lacrimal, XVI: 143
mammary, XVI: 141
prostate, XVI: 139
submaxillary, XVI: 135
thyroid, XVI: 145
sweat, XV: 89
Goitre, XVI: 145
Gonorrhea, XVI: 139
Groin
lymphatics, XV: 85
Gumma
testicle, XVI: 139

Hand (see also under Bones)
acromegaly, XVI: 133
amputation, XVI: 133
arteries, XV: 84
gangrene, XVI: 146
lymphatics, XV: 85
mummified, XVI: 146
nerves, XV: 85
diseases, XVI: 135
injuries, XVI: 135
veins, XV: 85
varicose, XVI: 134

Hair follicles, XV: 89
Head
  arteries, XV: 84
  lymphatics, XV: 85
  nerves, XV: 85
  sections, XV: 85
  shrunken, XVII: 44
  variations, XV: 79
  veins, XV: 85
Heart, XV: 84
  abnormalities, XVI: 134
  adult, XV: 84
  child, XV: 84
  diseases and local lesions, XVI: 133
  fetal, XV: 84, 87
  injuries, XVI: 135
Hematocele
  uterus, XVI: 141
  vaginal, XVI: 139
Hematoma
  uterus, XVI: 140
Hemorrhage
  bladder, XVI: 139
  brain, XVI: 135
  stomach, XVI: 136
Hemorrhoids, XVI: 134
Hernia
  femoral, XVI: 136
  inguinal, XVI: 136
    strangulated, XVI: 136
  iris, XVI: 143
  mesenteric, XVI: 136
  umbilical, XVI: 136
Historical Gifts
  general, XVII: 44
  medical, XVII: 43
  military, XVII: 44
Human Horn, XVI: 145
Humerus (see under Bones)
Hydrocele, XVI: 139
Hydrocephalus, XVI: 132, 133
  intra-uterine, XVI: 132
Hydronephrosis, XVI: 138
Hydroophthalmos, XVI: 142
Hydrosalpinx, XVI: 140
Hyperostosis, XV: 138, 142
Hypertrophy
  bladder, XVI: 139
  bones, XV: 132, 138, 139
  gallbladder, XVI: 137
  heart, XVI: 133, 134
  prostate gland, XVI: 139
  spleen, XVI: 135
  stomach, XVI: 136
  thyroid gland, XVI: 145
Hyphemia, XVI: 143
Hypoplasia, XVI: 130

Incisors (see under Teeth)
Injuries
  animal bones, XVII: 24
  bones, XV: 128 to 136
  bladder, XVI: 139, 142
  brain, XVI: 135
  extremities, XVI: 133, 146
  gunshot, XV: 128 to 136; XVI: 137
  heart, XVI: 135
  intestines, XVI: 137
  kidney, XVI: 142
  lungs, XVI: 138
  nerves, XVI: 135
  penis, XVI: 142, 145
  skin, XVI: 145, 146
  spinal cord, XVI: 135
  stomach, XVI: 142
  testicle, XVI: 142
Innominate (see under Bones)
Instruments
  anal and rectal, XVII: 27
  anesthetic apparatus, XVII: 27
  antiseptic apparatus, XVII: 28
  aural and acoustic, XVII: 28
  cupping, phlebotomy and leeching, XVII: 28, 29
  dental, XVII: 29
  diagnostic, XVII: 29, 30
  general purpose, XVII: 30, 31
  general surgical, XVII: 31, 32, 33
  gynecological, XVII: 33, 34, 35
  intestinal and hernia operations, XVII: 36
  maternity, XVII: 36
  microscopes, XVII: 36
  nose and throat, XVII: 36, 37, 38
  obstetrical, XVII: 38, 39
  ophthalmic, XVII: 39, 40
  urethral, XVII: 40, 41
  foreign, XVII: 42
Intestinal Tract
  arteries, XV: 85
  nerves, XV: 85
Intestines
  anomalies, XVI: 137
  anastomosis, XVI: 136
  cholera specimens, XVI: 136
  diseases, XVI: 136, 137

experimental surgery, XVI: 136
injuries, XVI: 137
obstructions, XVI: 136
stricture, XVI: 136
typhoid fever, XVI: 136
Ilium (see under Bones)
Iritis, XVI: 143
Ischiopagus tripus, XVI: 132

Jaundice
discoloration in eyeball, XVI: 142
Jaw
ankylosis, XV: 140
osteosarcoma, XV: 139
sarcoma, XV: 140

Keratitis, XVI: 143
Kidney, XV: 87
abnormalities, XVI: 141, 142
diseases and local lesions, XVI: 138, 139
injuries, XVI: 142
Knee
osteosarcoma, XV: 139
Knee-joint (see under Articulations)

Laceration
aorta, XVI: 135
tendon, XVI: 144
Lantern slides
brain, XVII: 42
bronchi (obstruction), XVII: 42
duodenal tube drainage, XVII: 42
ear, anatomy and pathology, XVII: 42
emotions, XVII: 42
eye, anatomy and pathology, XVII: 42
head sections, XVII: 42
Larynx, XV: 87
abnormalities, XVI: 138
diseases, XVI: 137, 138
lymphatics, XV: 85
Leg (see also under Bones)
amputations, XVI: 133
elephantiasis, XVI: 135
varicose veins, XVI: 134
Leprosy, XVI: 145
Ligaments
shoulder-joint, XV: 84
Lipoma (see under Tumors)
Lips
lymphatics, XV: 85
Liver, XV: 87
arteries, XV: 85
diseases and local lesions, XVI: 137
fetal, XV: 87
veins, XV: 85
Loose Bodies in Joints
knee-joint, XV: 137
Lumbar (see under Bones, vertebrae)
Lungs
arteries, XV: 84
diseases, XVI: 138
fetal, XV: 84, 87
injury, XVI: 138
Luxations, XV: 135, 136, 137
Lymphatic System (see Systems, Lymphatic)
Lymphatics, XV: 85
abdominal cavity, XV: 85
arytenoepiglottidean fold, XV: 85
axillary region, XV: 85
bladder, XV: 85
canal of Fontana, XV: 85
diseases of, XVI: 135
ear, XV: 85, 88
epiglottis, XV: 85
face, XV: 85
fauces, XV: 85
foot, XV: 85
genitals, XV: 85
groin, XV: 85
hand, XV: 85
head, XV: 85
inguinal region, XV: 85
larynx, XV: 85
lips, XV: 85
nasal cavities, XV: 85
neck, XV: 85
palate, XV: 85
penis, XV: 85
scalp, XV: 85
scrotum, XV: 85
thoracic cavities, XV: 85
tongue, XV: 85
vertebral column, XV: 85
Lymphosarcoma (see under Tumors)

Mandible (see under Bones)
Maxilla (see under Bones)
Medulla oblongata (see under Brain)
Megacolon, XVI: 137
Melanoma (see under Tumors)
Melanosarcoma (see under Tumors)
Melanosis
liver, XVI: 137
lungs, XVI: 138

Membranes
diphtheritic, of croup, XVI: 138
embryo, XV: 88
fetus, XV: 88
tympanic, XV: 88
diseases and local lesions, XVI: 144
Metacarpals (see under Bones)
Microcephalus, XVI: 130
Microscopic slides
historical, XVII: 42, 43
scientific, XVII: 42
Molar (see under Teeth)
Mole, hydatidiform, XVI: 141
Monsters, XVI: 132, 133
Muscles
diseases and local lesions, XVI: 144
face and neck, XV: 89
Mustard gas
diseases, XVI: 138
poisoning, XVI: 138
Mydriasis, XVI: 143
Myocarditis, XVI: 134
Myofibroma (see under Tumors)
Myoma (see under Tumors)
Myosis, XVI: 143
Myxoma (see under Tumors)

Naevus
eyelid, XVI: 144
Necrosis, XV: 130, 131, 137, 138, 139, 141, 142
arytenoid cartilage, XVI: 138
phosphorus, XV: 142
syphilitic, XV: 142
Neck
lymphatics, XV: 85
Nephritis, XVI: 138, 139
Nerves, XV: 85
axillary region, XV: 85
cerebellum, XV: 85
brain, XV: 85
diseases, XVI: 135
hands, XV: 85
head, XV: 85
intestinal tract, XV: 85
injuries, XVI: 135
skull, XV: 76
spinal cord, XV: 85
teeth, XV: 86
thorax, XV: 85
Nervous System (see System, Nervous)
Nose
diseases and local lesions, XVI: 137

Obstruction
intestines, XVI: 136
lacrimal gland, XVI: 143
valves of heart, XVI: 134
cervical canal, XVI: 141
Odontoma (see under Tumors)
Occipital (see under Bones)
Omentum
diseases, XVI: 136
Oophoritis, XVI: 140
Orbit, region of, XV: 81
Orchitis, XVI: 139
syphilitic, XVI: 139
Organs,
ear, XV: 88, 89
eye, XV: 88
reproductive
male, XV: 87
abnormalities, XVI: 142
diseases and local lesions, XVI: 139
injuries, XVI: 142
female, XV: 87
abnormalities, XVI: 142
diseases and local lesions, XVI: 139, 140, 141
urinary, XV: 87
abnormalities, XVI: 141, 142
diseases and local lesions, XVI: 138, 139
injuries, XVI: 142
Ossification
costal cartilage, XVI: 131
thyroid and cricoid cartilages, XVI: 137
Osteitis, XV: 132, 137, 138, 139
condensing, XV: 132, 138, 139
deformans, XV: 138
rarefying, XV: 138
syphilitic, XV: 138
Osteomalacia, XV: 138
Osteomyelitis, XV: 138
Osteoporosis, XV: 142
Osteosarcoma (see under Tumors)
Osteosclerosis, XV: 142
Ovary
diseases and local lesions, XVI: 139, 140
Ovum, XV: 88
myxomatous disease (hydatidiform mole), XVI: 141

Pachymeningitis, XVI: 135
Pacchionian depressions, XV: 76
Paget's Disease (see Osteitis deformans)
Palate (hard)
lymphatics, XV: 85

Pancreas
diseases, XV: 137
Pannus, XVI: 143
Papilloma (see under Tumors)
Parametritis, XVI: 141
Paraphimosis, XVI: 139
Parasites, XVII: 25
Parietal (see under Bones)
Parturition, morbid, XVI: 141
Patella (see under Bones)
Pelvis (see under Bones)
Penis
abnormalities, XVI: 142
amputation, XVI: 139
diseases, XVI: 139
injuries, XVI: 142
lymphatics, XV: 85
Perforation
appendix vermiformis, XVI: 137
gallbladder, XVI: 137
eye, XVI: 143, 144
stomach, XVI: 136
tympanic membrane, XVI: 144
Peribronchitis, XVI: 138
Pericarditis, XVI: 134
Pericardium, XV: 84
adherent, XVI: 134
Periostitis, XV: 132, 138, 139
syphilitic, XV: 139
Peritoneum
cancer, secondary, XVI: 136
sarcoma, XVI: 136
Peritonitis
appendix vermiformis, XVI: 137
colon, XVI: 136
uterus, XVI: 140
Phalanges (see under Bones)
Pharynx
diseases, XVI: 137
Phimosis, XVI: 142
Photographs, skiagraphs and drawings
abnormalities, XVII: 44
anatomical, XVII: 44
apparatus, surgical, XVII: 44
dislocations, XVII: 44
embryological, XVII: 44
gynecological, XVII: 44
historical, XVII: 44
medical, XVII: 44
showing effects of mustard gas, XVII: 45
miscellaneous, XVII: 44
obstetrical, XVII: 44
pathological, XVII: 44, 45
surgical, XVII: 45
trench foot, XVII: 45
Placenta, XV: 88; XVI: 141
Plexus (choroid), XV: 85
Polypus
intestines, XVI: 136
nose, XVI: 137, 142
stomach, XVI: 136
uterus, XVI: 141
Pott's Disease (see under Tuberculosis)
Pregnancy
abnormal, XVI: 142
Premolars (see under Teeth)
Pressure Necrosis, XV: 137, 142, 143
Process(es)
alveolar, XV: 81, 86
exostosis, XV: 141
necrosis, XV: 142
condyloid, XV: 79
orbital, XV: 81
spinous, XV: 82
Proctectomy, XVI: 137
Products of Conception, XV: 88
embryo, XV: 88
fetus, XV: 88
membranes, XV: 88
ovum, XV: 88
placenta, XV: 88
Prostate Gland
diseases, XVI: 139
Prostatectomy, XVI: 139
Pterygium, XVI: 143
Pyelonephritis, XVI: 139
Pyosalpinx, XVI: 140, 141

Radius (see under Bones)
Rarefaction
metatarsal, XV: 143
Receptaculum chyli, XV: 87
Rectum
abnormalities, XVI: 137
diseases and local lesions, XV: 137
Region(s)
axillary, XV: 84, 85
arteries, XV: 84
lymphatics, XV: 85
nerves, XV: 85
clavicular
lymphatics, XV: 85

inguinal
lymphatics, XV: 85
veins, XV: 85
nasal
variations, XV: 87
orbital, XV: 81
sections, XV: 81
variations, XV: 81, 86
Respiratory System (see Systems, Respiratory)
Retinitis, XVI: 144
Rickets, XV: 139
skeleton of rachitic dwarf, XVI: 133, 141
Ribs (see under Bones)
Roots
teeth, XV: 79, 80, 86
Rupture
colon, XVI: 137
esophagus, XVI: 136
fallopian tube, XVI: 142
gallbladder, XVI: 137
heart, XVI: 134
kidney, XVI: 142

Sacrum (see under Bones)
Sarcoma (see under Tumors)
Scalp
lymphatics, XV: 85
tumor, XV: 140; XVI: 146
Scaphocephalus, XVI: 130
Scapula (see under Bones)
Scrotum
diseases, XVI: 139
lymphatics, XV: 85
Sequestra, XV: 142
Shoulder-joint (see under Articulations)
Siamese Twins, XVI: 133
Sinuses, XV: 80, 81
frontal, XV: 80, 81
maxillary, XV: 80, 81
abnormalities, XVI: 130
caries, XV: 140
exostosis, XV: 141
tumor, XV: 140
skull, XV: 76
sphenoidal, XV: 81
variations, XV: 80, 81, 86, 87
Skeleton (see also under Bones)
acromegalic, XVI: 133
adult, XV: 76
abnormalities, XVI: 129, 133
diseases and local lesions, XVI: 133
fetal, XV: 76
abnormalities, XVI: 132
diseases and local lesions, XVI: 132, 133
monsters, XVI: 132, 133
Skeletons of animals, XVII: 23
Skin, XV: 89
abnormalities, XVI: 145
diseases, XVI: 144, 145
injuries, XVI: 145, 146
Skulls of animals, XVII: 24
caries, XVII: 24
Skull(s) (see also under Bones)
abnormalities, XVI: 130, 131, 132, 133
adults, XV: 76, 77, 78, 79
arteries, XV: 85
bones, XV: 79, 80, 81
deformity, XVI: 130, to 133
brachycephalic, XVI: 130
Eanthropus, XV: 77
fetal, XV: 76
hydrocephalic, XVI: 132
Hyrtl Collection, XV: 77, 78, 79
internal membrane, XV: 76
microcephalic, XVI: 130
Neanderthal, XV: 77
nerves, XV: 76, 85
Peruvian, trephined, XV: 76; XVI: 133
Pithecanthropus Erectus, XV: 77, 84
scaphocephalic, XVI: 130
Sinanthropus Pekinensis, XV: 77
sinuses, XV: 76
variations, XV: 76
vascular supply, XV: 76
Special Sense-Organs (see under Eye, Ear)
Spermatic Cord
diseases, XVI: 139
Sphenoid (see under Bones)
Spina bifida, XVI: 131, 132, 133
Spinal cord, XV: 85, 86
diseases, XVI: 135
injuries, XVI: 135
nerves, XV: 85, 86
Spleen
anomalies, XVI: 135, 137
diseases and local lesions, XVI: 135
Staphyloma, XVI: 143
Stenosis
aortic valves, XVI: 134
aorta; congenital, XVI: 134
Sternum (see under Bones)

Stomach
anomaly, XVI: 135, 137
diseases and local lesions, XVI: 136
injuries, XVI: 136, 137
Strabismus, XVI: 144
Stricture
esophagus, XVI: 136
intestines, XVI: 136
larynx, XVI: 137, 138
rectum, XVI: 137
urethra, XVI: 138, 139
Surgical lesions (healed), XVI: 133
Sutures
abnormalities, XVI: 130, 131
separation, XV: 128
Synechia
iris, XVI: 143
Synostosis
ribs, XVI: 131
tarsus and metatarsus, XVI: 132
vertebrae, XVI: 131
Syphilis
bones, XV: 132, 138, 139, 142
eyelid, XVI: 144
larynx, XVI: 137, 138
liver, XVI: 137
testicle, XVI: 139
Systems
blood-vascular, XV: 84, 85
abnormalities, XVI: 134
diseases and local lesions, XVI: 133
injuries, XVI: 135
digestive, XV: 86, 87
abnormalities, XVI: 137
diseases and local lesions, XVI: 135, 136, 137
injuries, XVI: 137
lymphatic, XV: 85
diseases, local lesions, XVI: 135
nervous, XV: 85, 86
abnormalities, XVI: 135
diseases and local lesions, XVI: 135
injuries, XVI: 135
respiratory, XV: 87
abnormalities, XVI: 138
diseases and local lesions, XVI: 137
injuries, XVI: 138
urogenital, XV: 87, 88
abnormalities, XVI: 141, 142
diseases and local lesions, XVI: 138, 139, 140, 141
injuries, XVI: 142
Talipes, XVI: 132, 133
Teeth (see also under Mandible)
abnormalities, XVI: 130, 131
canine, XV: 79, 86
deciduous, XV: 79, 86
development, XV: 79, 80, 86
incisors, XV: 79, 86
molars, XV: 79, 86
prehistoric, XVI: 131
nerves, XV: 86
permanent, XV: 79, 86
premolars, XV: 80, 86
roots, XV: 79, 80, 86
variations, XV: 79, 80, 86
vascular supply, XV: 76
veins, XV: 85
Teeth of animals
abnormalities, XVII: 24
Temporal (see under Bones)
Tendons
injuries, XVI: 144
repairs, XVI: 144
Testicle
abnormalities, XVI: 142
amputation, XVI: 139
diseases and local lesions, XVI: 139
injuries, XVI: 142
Thorax, XV: 82
arteries, XV: 84
lymphatics, XV: 85
nerves, XV: 85
sections, XV: 87
veins, XV: 85
Throat and respiratory passages, XV: 87
Thrombus, XVI: 134
Tibia (see under Bones)
Tongue, XV: 86
arteries, XV: 85, 86
diseases, XVI: 135, 138
lymphatics, XV: 85
Tonsils
diseases and local lesions, XVI: 135, 136
Trachea
abnormalities, XVI: 138
diseases, XVI: 138
foreign bodies, XVI: 138
tracheotomy, XVI: 138
Trephining, XVI: 133
Tuberculosis
adrenal gland, XVI: 145
bones, XV: 137, 139, 141, 142

coxalgia, XV: 139
intestines, XVI: 137
kidney, XVI: 139
larynx, XVI: 138
lungs, XVI: 138
mesentery, XVI: 136
ovary, XVI: 140
prostatic urethra, XVI: 139
uterus, XVI: 140
Tumors
adenocarcinoma
uterus, XVI: 140
adenoma
uterus, XVI: 140, 145
angiosarcoma
brain, XVI: 135
cancer (see also carcinoma)
colloid, of stomach, XVI: 136
diaphragm, secondary, XVI: 144
esophagus, XVI: 136
eye, XVI: 142, 144
intestines, XVI: 136
kidney, XVI: 138
larynx, XVI: 137
liver, XVI: 137
lungs, XVI: 138
mammary gland, XVI: 141
ovaries, XVI: 140
rectum, XVI: 137
scirrhus
humerus, secondary, XV: 140
mammary gland, XVI: 141
neck, XVI: 146
ovary, XVI: 140
pancreas, XVI: 137
submaxillary gland, XVI: 135
testicle, XVI: 139
uterus, XVI: 141
stomach, XVI: 136
testicle, XVI: 139
uterus, XVI: 140
carcinoma (see also cancer)
bladder, XVI: 139
intestines, XVI: 136
lacrimal duct, XVI: 143
mammary gland, XVI: 141
prostate gland, XVI: 139
stomach, XVI: 136
cysts
bilocular, of ovary, XVI: 140
bladder, XVI: 142
broad ligament, XVI: 140
dental, XV: 141
dermoid, XVI: 140, 145
gland of Bartholin, XVI: 141
kidney, XVI: 138, 139
meibomian, XVI: 144
multilocular, of ovary, XVI: 140
nates, XVI: 145
neck, XVI: 145
ovary, XVI: 140
parovarian, XVI: 140
scalp, XVI: 145
spermatic cord, XVI: 139
submaxillary triangle, XVI: 145
testicle, XVI: 139
thyroid gland, XVI: 145
unilocular, of ovary, XVI: 140
uterus, XVI: 140, 141
enchondroma
upper extremities, XVI: 145
trachea, XVI: 138
epithelioma
clitoris, XVI: 141
foot, XVI: 145
hand, XVI: 145
jaw, XVI: 145
larynx, XVI: 137
lip, XVI: 145
penis, XVI: 139
stomach, XVI: 136
uterus, XVI: 140
fibroma, XVI: 145
bladder, XVI: 139
ear, XVI: 145
jaw, XVI: 145
neck, XVI: 145
nerves, XVI: 135
ovary, XVI: 140
scalp, XVI: 145
shoulder, XVI: 145
testicle, XVI: 139
uterus, XVI: 140, 141
vagina, XVI: 141
vulva, XVI: 141
fibromyoma
uterus, XVI: 141
fibrosarcoma
uterus, XVI: 141
lipoma
back, XVI: 146
neck, XVI: 146

shoulder, XVI: 146
spermatic cord, XVI: 139
lymphosarcoma, XVI: 135
melanosis, XVI: 136
melanosarcoma
eye and surrounding parts, XVI: 142, 143, 144
meningioma, XVI: 135
myofibroma
broad ligament, XVI: 140
uterus, XVI: 141
myoma
uterus, XVI: 141
myxoma
chorion, XVI: 141
fetus, XVI: 146
nose, XVI: 146
odontoma, XV: 139
osteosarcoma
articulations, XV: 139
innominate bone, XV: 139
jaw, XV: 139
lower extremities, XV: 139
upper extremities, XV: 139
papilloma, XVI: 146
bladder, XVI: 139
broad ligament, XVI: 140
eye and surrounding parts, XVI: 143
rectum, XVI: 137
tonsil, XVI: 136
sarcoma
buttock, XVI: 146
clavicle, XV: 140
jaw, XV: 140
lacrimal gland, XVI: 143
meninges, XVI: 135
ovary, XVI: 140
round-cell
forearm, XVI: 146
temporal bone, XV: 140
uterus, XVI: 141
spindle-cell
mammary gland, XVI: 141
ovary, XVI: 140
retroperitoneum, XVI: 136
testicle, XVI: 139
thigh, XVI: 146
testicle, XVI: 139
tonsil, XVI: 136
unspecified
antrum, XV: 140
brain, XVI: 135
buttock, XVI: 146
eye and surrounding parts, XVI: 143
femur, XV: 140
facial region, XVI: 146
fallopian tube, XVI: 140
lacrimal gland, XVI: 143
larynx, XVI: 137, 138
mandible, XV: 140
mammary gland, XVI: 141
melanotic, of eyelid, XVI: 144
mitral valve, XVI: 134
pharynx, XVI: 137
scalp, XV: 140
scrotum, XV: 139
thyroid, XVI: 138
upper extremities, XVI: 146
uterus, XVI: 141
Typhoid fever, lesions, XVI: 136

Ulceration
bladder, XVI: 139
cancerous, of eyelid, XVI: 144
conjunctiva, XVI: 143
cornea, XVI: 143
epiglottis, XVI: 137
gangrenous
epiglottis, XVI: 135
tongue, XVI: 135
tonsils, XVI: 135
intestines, XVI: 137
larynx, XVI: 137, 138
stomach, XVI: 136
syphilitic
eyelid, XVI: 144
larynx, XVI: 138
tuberculous
kidney, XVI: 139
prostatic urethra, XVI: 139
Ulna (see under Bones)
Umbilical cord
abnormalities, XVI: 142
Urinary organs
abnormalities, XVI: 141, 142
diseases and local lesions, XVI: 138, 139
injuries, XVI: 142
Urogenital System (see under Systems, Urogeni
Uterus, XV: 87, 88
abnormalities, XVI: 142
diseases and local lesions, XVI: 142

Vagina
diseases, XVI: 141

Valves
heart
atheroma, XVI: 133
degeneration, XVI: 134
obstruction, XVI: 134
stenosis, XVI: 134
tumor, XVI: 134
ileocaecal, XV: 87
Variations
condyles, XV: 80
mandible, XV: 79, 80
nasal region, XV: 87
orbital region, XV: 81, 86
sinuses, XV: 80, 81, 86, 87
skulls, XV: 76
teeth, XV: 79, 80, 86
Varicocele, XVI: 139
Veins
abdominal cavities, XV: 85
diseases and local lesions, XVI: 134
embryonic, XV: 85
hand, XV: 85
head, XV: 85
hepatic, XV: 85
inguinal region, XV: 85
portal, XV: 85, 87
skull, XV: 85
teeth, XV: 85
thoracic cavity, XV: 85
varicose, XVI: 134
vertebral column, XV: 85
Verruca, of eyelid, XVI: 144
Vertebrae (see also under Bones, and Column, vertebral)
Viscera
thoracic, of fetus, XV: 87
Vulva
diseases and lesions, XVI: 141

Pathological Society of Philadelphia

Proceedings

N.S. Vol. 37: November, 1948–May, 1949

Ernest E. Aegerter, *President*
Warner F. Sheldon, *Secretary*
John E. Gregory, *Chairman, Program Committee*

November 11, 1948

William Wood Gerhard Memorial Lecture:
The Relationship of Protein Deficiency to Increased Susceptibility to Infection. Paul R. Cannon. (*Abstract 1, below*)

December 9, 1948

Experimental Hepatic Injury. Paul György. (*Abstract 2, below*)
Post-Necrotic Cirrhosis (Nodular Hyperplasia). Balduin Lucké. (*No abstract supplied.*)
Application of Liver Function Tests. J. Edward Berk. (*Abstract 3, below*)
The Liver Punch Biopsy. Winston K. Shorey. (*No abstract supplied.*)

January 13, 1949

The Pathogenesis of Certain Bone Diseases in Terms of Normal Bone Growth. Richard H. Follis, Jr. (*Abstract 4, below*)

February 10, 1949

Newer Concepts on the Prognosis and Treatment of Leukemias, with Special Reference to Nitrogen Metabolism Studies. Max M. Strumia. (*No abstract supplied.*)
Variants of Chronic Granulocytic Leukemia. R. Philip Custer, James Butcher, and Edward C. Meek, Jr. (*Abstract 5, below*)
Aminopterin in Leukemia. Irving J. Wolman and John H. Githens. (*Abstract 6, below*)
Marrow Aspiration as a Diagnostic Aid. John W. Howard. (*Abstract 7, below*)

Special Meeting, April 21, 1949

Slide Seminar on Tumors of Peripheral Nerves.

May 12, 1949

Sarcoidosis in Philadelphia. Maurice Sones, Harold Israel, and Samuel C. Stein. (For abstract, see Transactions of the Section on General Medicine in *Transactions & Studies of the College of Physicians of Philadelphia*, 4th s., vol. 17, no. 2, June, 1949.)
The Pathology of Boeck's Sarcoid. Jesse H. Frank. (*Abstract 8, below*)
Cytologic Examination of Sediment from the Esophagus in a Case of Intra-epidermal Carcinoma of the Esophagus. Joseph E. Imbriglia and Mieczyslaw S. Lopusniak. (*Abstract 9, below*)

Abstracts

Abstract 1

The Relationship of Protein Deficiency to Increased Susceptibility to Infection. Paul R. Cannon.

There is accumulating evidence that the loss of the body's protein stores, both structural and functional, leads in time to a lowered resistance to infection. Recent studies in lower animals and in man have shown that severe and prolonged undernutrition may lead to a progressive depletion of the tissue protein stores and an impaired ability of such tissues

to form antibodies. This is not surprising in view of the fact that specific antibodies are now known to be protein substances which are synthesized within the tissues from dietary amino acids, as are other tissue and plasma proteins. These facts emphasize the importance of adequate nutrition in the maintenance of an effective antimicrobic defense. If an inadequate diet, low in protein, is eaten for any considerable period of time, atrophy of the bone marrow and of lymphoid structures may also lead to a loss of resistance. But whether the loss of resistance stems from interference with mechanisms of natural or acquired immunity, adequate repletion with a diet containing high quality protein or even a mixture of amino acids will lead to cellular recovery of the marrow and lymphoid systems and to restoration of the body's capacity to fabricate antibodies.

Despite corroboration of these findings in man, however, a few observers disagree as to the role of dietary protein in resistance. Examination of their experiments indicates either an inadequate depletion of the tissue protein stores, or technical faults in the procedures to measure antibody formation or resistance. Careful assessment of available evidence leaves little doubt of the primary importance of dietary protein in the prevention and treatment of infectious processes in severely debilitated subjects. But dietary protein alone cannot be expected to be effectively utilized; it must be eaten simultaneously with a diet also adequate in calories, vitamins and minerals.

Abstract 2

EXPERIMENTAL HEPATIC INJURY. Paul György.

From a pathologic point of view necrosis and cirrhosis are the characteristic manifestations of injury to the hepatic parenchyma. Fat infiltration *per se* is not specific enough, and often too transient, without concomitant manifestations of tissue reaction, to be considered in itself as a truly pathologic condition of the liver.

Three outstanding results characterize the latest developments in the experimental approach to diseases of the liver; i.e., 1) recognition of purely nutritional factors as important determining causes of hepatic injury, 2) the prevention, arrest and even possible reversal of this pathologic process simply by proper change in the composition of the experimental diet, and 3) the interrelation between dietary and endocrine factors in the pathogenesis of hepatic injury.

The complicated relationship of dietary factors to cirrhosis and acute necrosis may be tabulated as follows:

EFFECT ON THE PREVENTION OF	PROTEIN (METHIONINE-CONTAINING)	METHIONINE	CYSTINE	CHOLINE	VITAMIN E	FAT
Cirrhosis	Beneficial	Beneficial	Injurious	Beneficial	0	Injurious
Acute Necrosis (massive or zonal)	Beneficial	Beneficial	Beneficial	0 or injurious	Beneficial	0 or injurious

Among fats, cod liver oil, and in general fats with a high content of unsaturated fatty acids (lard) are more injurious than fats with low iodine number.

The beneficial effect of vitamin E and cystine on acute necrosis may indicate that both of these substances act through a detoxifying mechanism.

Female rats are more resistant to the production, and at the same time, more responsive to the treatment of experimental dietary cirrhosis.

The problem of dietary therapy of hepatic cirrhosis in rats is not as satisfactorily solved as its production.

Abstract 3

APPLICATION OF LIVER FUNCTION TESTS. J. Edward Berk.

Certain factors must be considered in applying liver function tests to the diagnosis of hepatic cirrhosis. These include: (1) *The Criteria for the Pathologic Diagnosis of Cirrhosis.* Significantly positive liver function tests are not to

be expected if cases with inconsequential degrees of fibrosis and little or no other changes are labeled as "cirrhosis". (2) *The Influence of the Various Anatomic Changes in the Liver on Hepatic Function.* Recent studies suggest that liver function tests are more apt to be abnormal when the parenchymal cells show diffuse damage and that fibrosis per se has little effect on liver function. (3) *The Influence of the Causative Factors Underlying the Cirrhosis.* Alterations in certain tests appear in rough fashion to distinguish at least two forms of cirrhosis of apparently different origin. In the primary fatty cirrhosis of the type associated with chronic alcoholism and deficient nutrition, the cephalin cholesterol flocculation test tends more frequently to be positive while the thymol turbidity and colloidal gold tests are commonly only weakly positive or negative. The reverse obtains in the cirrhosis of the massive nodular, post-atrophy type regarded as primarily infectious in character. An excess excretion of type III coproporphyrin has also been observed in the primary fatty type of cirrhosis in contrast to an excess excretion of type I coproporphyrin in the infectious type of cirrhosis (Watson). (4) *The Multiplicity of Functions and the Regenerative Capacity of the Liver.* In order comprehensively to study the many functions which the liver serves, a large number of tests designed to test different functions must be employed. Moreover, these tests preferably should be repeated serially in view of the dynamic character of liver function. (5) *The Nature of the Tests.* As their name designates, the tests are simply measures of liver function. They are not measures of hepatic disease and they yield no pathognomonic information regarding the disease process itself.

When liver function tests are properly chosen, when they are interpreted as reflecting merely function or dysfunction, and when they are correlated with the clinical picture and the histologic findings, they are highly valuable in helping arrive at a proper diagnosis in cirrhosis. They are additionally useful when employed in serial fashion during treatment to give evidence of change in the functional status of the organ.

Abstract 4

THE PATHOGENESIS OF CERTAIN BONE DISEASES IN TERMS OF NORMAL BONE GROWTH. Richard H. Follis, Jr.

Bone diseases, excluding inflammatory lesions and tumors, can best be understood in terms of the various sequences involved in normal bone growth. If one breaks down these events into their main categories: growth of cartilage, osteoblastic and osteolytic activities and the deposition of inorganic constituents in cartilage matrix and/or osteoid, one can evolve a satisfactory classification of bone disease as follows:

I. DISTURBANCE IN GROWTH OF CARTILAGE
  1) Increased Activity
    a) Hyperpituitarism, b) Hyperthyroidism
  2) Decreased Activity
    a) Inanition, b) Hypopituitarism, c) Hypothyroidism, d) Achondroplasia

II. DISTURBANCE IN OSTEOGENIC-OSTEOLYTIC BALANCE
  1) Decreased Osteoblastic Activity
    a) Inanition and disuse, b) Hypopituitarism, c) Hypothyroidism, d) Ascorbic acid deficiency, e) Osteogenesis imperfecta, f) Post-menopausal osteoporosis, g) Cushing's Syndrome
  2) Increased Osteoblastic Activity
    a) Increased local activity and blood supply, b) Acromegaly, c) Androgenic stimulation (?), d) Hyperestrogenism (mouse), e) Hypertrophic osteoarthropathy
  3) Decreased Osteolytic Activity
    a) Marble bone disease, b) Hyperestrogenism (rat)
  4) Increased Osteolytic Activity
    a) Acute severe inanition, b) Disturbance in serum Ca and/or P. (hyperparathyroidism, hypervitaminosis D, nephritis, acidosis), c) Paget's Disease, d) Hypervitaminosis A.

III. DISTURBANCE IN DEPOSITION OF INORGANIC ELEMENTS IN CARTILAGE MATRIX AND/OR OSTEOID
  1) Defective Ca and/or P. (Rickets, osteomalacia)
  2) Excessive Pb, Bi, Sr.

Such a classification as the above is, of course, not a rigid one since only the primary defect is listed. For instance, in Paget's disease the initial change is an increased osteolytic

activity; however, in the stage which one usually examines such a bone under the microscope increased osteoblastic activity may be much more conspicuous.

Selected examples of the various types of bone disease mentioned in the classification have been illustrated and discussed.

Abstract 5

VARIANTS OF CHRONIC GRANULOCYTIC LEUKEMIA. R. Philip Custer, James Butcher, and Edward C. Meek, Jr.

The manifold expressions of chronic granulocytic leukemia, both clinical and pathological, have engendered an unnecessarily complex nomenclature to denote numerous variants of the disease. Some of the terms do not imply any relationship to leukemia and, indeed, certain of the variants are regarded by some authors as being quite different diseases. In an effort to clarify the situation, some of the more variable features of the disease are considered, as indicated in the following tabulation:

TYPICAL	DATA	VARIANT
Adult	AGE INCIDENCE	Congenital or Childhood
Present	CLINICAL MANIFESTATIONS	Absent
Increased	GRANULAR LEUKOCYTE COUNT	Normal or Decreased
Predominantly Neutrophilic	TYPE OF GRANULAR LEUKOCYTE	Eosinophilic or Basophilic
Predominantly Mature	MATURITY OF GRANULAR LEUKOCYTE	Acute Myeloblastic Crises
Normal or Decreased	ERYTHROCYTE COUNT	Increased
None to Moderate Numbers	CIRCULATING NUCLEATED RED BLOOD CELLS	Great Numbers
Normal or Decreased	THROMBOCYTE COUNT	Increased
None to Moderate	ASSOCIATED MEGAKARYOCYTOSIS	Excessive
Excessive Granulopoiesis	BONE MARROW	Fibrous or Bony Replacement

We would like to use primarily the generic term, chronic granulocytic leukemia, and subordinate the type as indicated: congenital or childhood, subclinical, subleukemic or aleukemic, eosinophilic or basophilic, acute relapsing, erythrocythemic, leukoerythroblastic, thrombocythemic, megakaryocytic, and osteosclerotic or myelofibrotic. Illustrative cases are presented.

Abstract 6

AMINOPTERIN IN LEUKEMIA. Irving J. Wolman and John H. Githens.

Of twenty-two children treated with aminopterin for more than two weeks, 20 (91 per cent) exhibited at least temporary clinical improvement. Thirteen (60 per cent) showed initial bone marrow remissions to at least 75 per cent normal. Four (18 per cent) have been kept in complete remission since starting treatment two to six months ago. This drug has proven far superior to blood transfusions, urethane, and all other methods employed in the past for the alleviation of leukemia in childhood. Generally speaking, within two weeks after the first dose, the marrow in favorable cases showed the reappearance of megakaryocytes, a return of erythropoiesis (in some to a hyperplastic degree), and a marked diminution in mitotic activity of the white cells. There was also recession of the enlarged liver, spleen and lymph nodes, rise in hemoglobin level and platelets, and reversion of peripheral blood towards normal.

The recommended dosage of aminopterin is 0.5 to 1.0 mg. per day, intramuscularly, while the child is in the initial stage of treatment. Adequate dosage for good maintenance has varied considerably. Success in treatment depends on individualizing the dosage. Ulceration of the lips, buccal mucosa, or tongue, has been the first sign of intoxication, and occurred in 73 per cent. Increase in the tendency to hemorrhage was associated with the early stages of treatment in 82 per cent. It is too early to make long-term predictions as to the life expectancy of aminopterin-treated patients.

Abstract 7

MARROW ASPIRATION AS A DIAGNOSTIC AID. John W. Howard.

While bone marrow has been well studied by biopsy and trephine, the present simple method of obtaining it from the sternum was not introduced until 1929 by Arinkin. Since then many different methods and needles have been devised to obtain marrow. In experienced hands almost any simple rugged stilletted needle will suffice. As the sternum was the most accessible site for red marrow most of the earlier aspirations were made on it. Recent interest has focused on other suitable sites for marrow puncture. Iliac crest puncture has been proposed as offering greater safety, less patient apprehension and discomfort, and more convenient repetition. The spinous processes have been suggested also as a primary or alternative site. Multiple sites of puncture, beside offering an alternative approach in the apprehensive patient, also permit confirmation of findings in potential patchy marrow involvement.

The preparation of aspirated marrow for study is probably the most important step in these studies. Smears offer excellent cytological material but fail to allow histopathological study. If the aspiration is for diagnosis only, differential counts are unnecessary and are frequently misleading. Excellent histological specimens can be prepared from solid marrow particles in aspirated marrow or adhering to the barrel of the syringe. By suspending these particles in plasma and then producing a jell with the aid of topical thrombin the preparation of the material is improved.

Abstract 8

THE PATHOLOGY OF BOECK'S SARCOID. Jesse H. Frank.

Surgical specimens from ten cases and material from five autopsies were studied. Sarcoid lesions were observed in the skin, lymph nodes, tonsil, lachrymal gland, lungs, spleen, liver, heart, kidney, endometrium, cervix, pituitary, pineal and brain. The typical lesion the sarcoid tubercle, is a collection of epithelioid cells and occasional giant cells showing no caseation. It is usually sharply demarcated from the intervening tissue which is unaffected by its presence. Small areas of central fibrinoid necrosis may occur and do not vitiate the diagnosis.

Variations from this typical lesion may occur. The tubercles may fuse into large masses. Most, or all of the tubercles, may be composed of giant cells. There may also be a diffuse scattering of giant cells in the tissue with no tubercle formation. Asteroid bodies, star-like crystalloid inclusions, are frequently seen in the giant cells. Schaumann bodies, scalloped and laminated structures, staining deep blue with hematoxylin also occur free in the tissue within the tubercles or partly or wholly within the giant cells. The nature of both of these structures remains undetermined. Exceptionally, the presence of the sarcoid nodules may stimulate an inflammatory reaction in the surrounding tissue.

Sections from a case showing widely disseminated sarcoid lesions were demonstrated also three sections from borderline cases whose relation to sarcoidosis was unproven. Although the pathologic anatomy of Boeck's sarcoid and of tuberculosis are alike, this similarity, as with other granulomatous diseases is not sufficient to allow the conclusion that they have a common etiology.

Abstract 9

CYTOLOGIC EXAMINATION OF SEDIMENT FROM THE ESOPHAGUS IN A CASE OF INTRA-EPIDERMAL CARCINOMA OF THE ESOPHAGUS. Joseph E. Imbriglia and Mieczyslaw S. Lopusniak.

An attempt was made to obtain gastric contents for cytologic examination in a 63 year old white male who complained of dysphagia, vomiting and a 30 pound weight loss for 11 months. Roentgenographically it was thought a malignant neoplasm involved the distal third of the esophagus. To the esophagoscopist the

mucous membrane appeared normal, but a bulging of submucosal thickening was noted. The impression was that a lesion arose from the cardia of the stomach and infiltrated the wall of the esophagus. Biopsy and secretions obtained at the time of esophagoscopy were reported as showing no evidence of carcinoma.

The tip of the Rehfuss tube descended to approximately 3–4 cm. above the diaphragmatic hiatus; viscid fluid was removed by syringe from the esophagus. Smears of this material were classified as Papanicolaou Class IV (malignant cells noted).

A resection of the carcinoma of the esophagus and an esophago-gastrostomy were performed. Pathologic report was "chronic ulcer with fibrosis and in one area the epithelial covering showed abnormal cells similar to Bowen's disease."

Intubation of the esophagus is suggested as an adjunct to roentgenologic and endoscopic examinations in suspected lesions of esophagus. When we have not been able to obtain material from the esophagus, we have instilled physiological saline through the tube or permitted the patient to sip small quantities of saline; aspiration generally contains a sufficient amount of sediment for study.

OFFICERS

President: Ernest E. Aegerter (1948-9)
Vice-President: Herbert L. Ratcliffe (1948-9)
Secretary: Warner F. Sheldon (1946-9)
Treasurer: Peter A. Herbut (1946-9)

Changes in Membership

New Members

	Date of Election		*Date of Election*
Fust, John A., Jr.	1-13-49	Thomas, Wilber C.	2-10-49
Heid, George J., Jr.	1-13-49	Williams, R. B.	2-10-49
Schmidt, J. Ross	1-13-49	Wallis, Allan D.	2-10-49
Chu, Philip T.	1-13-49	Warga, Philip W.	5-12-49
Greeley, Joseph A.	1-13-49	Palmer, Lewis	5-12-49
Arey, James B.	2-10-49	Marx, Halvey E.	5-12-49
Campbell, William N.	2-10-49		

Resignations

Aronson, Joseph D. (1948)
Black, David (1948)
Carrington, William J. (1948)
Crew, Robert (1948)
Dixon, H. M. (1948)
Ellis, Mackinnon (1948)
Farley, David L. (1948)
Fishbock, David B. (1948)
Fisher, H. Russell (1948)
Fowler, Kenneth (1948)
Hayman, Joseph M. (1948)
Hoffman, Olive (1948)
Lanyon, William (1948)
Merrill, George C. (1948)
Park, Felix R. (1948)
Potter, F. C. (1948)
Schlumberger, Hans (1948)

Deaths

Favorite, Grant O. (1948)
Girvin, John H. (1938)
Hamill, S. McC. (1948)
Judson, C. F. (1948)
Maier, F. Hurst (1946)
Rees, W. T.
Ring, G. Oram (1933)
Sartain, Paul J. (1944)
Saxon, G. J. (1943)
Schaffer, Howard W. (1943)
Sinclair, J. F. (1948)
Solis-Cohen, Solomon (1948)
Stahl, B. Franklin (1944)
Stellwagen, Thomas C. (1935)
Swalm, Charles J. (1949)
Talley, J. E. (1941)
Walsh, Joseph (1946)

The William Wood Gerhard Medal 1948—Paul R. Cannon.

TRANSACTIONS & STUDIES

of the

College of Physicians of Philadelphia

Volume 17
(Fourth Series)

Number 3
(December 1949)

Comparison of Oral Penicillins*

By WILLIAM P. BOGER, M.D., JOHN O. BEATTY, M.D., AND HARRISON F. FLIPPIN, M.D.

A PREFERENCE for the oral over the parenteral route of administration of any medication is freely acknowledged when the two routes have equal therapeutic effects. With regard to penicillin, there has been and there is currently, a question whether orally administered penicillin can be relied upon to give therapeutic results comparable to those obtainable with the parenterally administered drug. The restricted supply of the antibiotic at the time that it was first employed makes it understandable that all of the possibilities of oral penicillin therapy were not explored. The almost unlimited supply of penicillin that is presently available makes possible the use of penicillin doses that were out of the question for the original penicillin investigators and consequently a re-evaluation of oral penicillin therapy. It seems appropriate to remark that the oral doses of aureomycin and chloramphenicol are calculated in grams and daily doses that range from 3 to 6 grams while the original observations on oral penicillin were made with doses of 10 and 15 milligrams, (15,000 to 20,000 units). One can only speculate whether the impact of aureomycin and chloramphenicol on clinical medicine would have been as great if investigators had been restricted to the use of milligram quantities of the drugs. It seems quite probable that if oral penicillin therapy be calculated in terms of grams in the same manner as that for aureomycin and chloramphenicol, a very different picture of the efficacy of oral penicillin may emerge. Only very recently have single oral doses as large as 250,000 units (166 milligrams) been freely mentioned (1) and comparatively few patients have been given as much as one million units, (0.66 grams) as a single or daily dose of oral penicillin, (2) (3) (4) (5).

A review of the literature on the subject of oral penicillin brings to light some very interesting facts. Few articles deal with oral penicillin doses of 100,000 or 200,000 units (2) (3) (4) (5) (6) (7) (8) (9) (10); it is difficult to find even twelve patients in the literature to whom the same doses of oral and intramuscular doses of penicillin have been compared in the same individuals (11) (12) (13) and in less than 6 patients so studied, have the urinary recoveries as well as plasma concentrations been estimated and correlated (4). The largest series of patients in whom two oral penicillin preparations have been compared,

* From Philadelphia General Hospital and the Section of Infectious Diseases, University of Pennsylvania Hospital, Philadelphia, Pa.

Presented before the College of Physicians of Philadelphia, Section on General Medicine, 24 October 1949.

consists of nine individuals (10). Few authors (4) (8) (10) (12) (13) (14) (15) (16) have employed patients as their own controls in comparing penicillin preparations. The statement that oral penicillin should be administered in five to ten times the dose that is administered intramuscularly is actually based on the study of fewer than 12 patients (4), and the ratio is established on the basis of the urinary recoveries, not on relative plasma concentrations attained. There is only one published paper on oral procaine penicillin, and this unfortunately presents data favoring sodium penicillin over procaine penicillin, a finding that we have been unable to confirm (8). Lastly, there are no comparative data on aluminum penicillin given by mouth. (Aluminum penicillin is to be distinguished from the admixture of aluminum hydroxide and penicillin.) In the face of this lack of controlled comparative data on oral penicillins, the following study was undertaken.

TABLE I

CODE	SALT OF PENICILLIN "G"	BUFFER		ROUTE
		Substance	Amount	
			(Gm.)*	
A	Sodium	0	0	Oral
B	Potassium	= Sodium bicarbonate + Sodium benzoate + Calcium carbonate	Trace	Oral
C	Potassium	Calcium carbonate	1.00	Oral
D	Procaine	Calcium carbonate	0.41	Oral
E	Aluminum	Sodium benzoate	1.20	Oral
F	Sodium	0	0	Intramuscular

* In tablets containing 200,000 units of the penicillin under consideration.

Six healthy, adult, male volunteers, differing little in age or weight, were studied in this investigation, each individual of the group receiving each of the five oral penicillin preparations and a single intramuscular injection of sodium penicillin in aqueous solution. A key and a description of the preparations used appears in *Table I*. The various oral preparations were administered in tablet form, and the lots of material used were obtained through the usual commercial channels. All of the preparations were assayed prior to use and were found to contain the labelled amount of penicillin within 10 per cent, plus or minus. Preparations A, C and D were dispensed as 100,000 unit tablets, and B and E as 50,000 unit tablets.

Because lesser quantities of penicillin administered orally have given either no detectable concentrations or inconstant and unpredictable plasma concentrations, a dose of oral penicillin was chosen for this investigation that has been found in our experience to give consistently detectable plasma concentrations of the antibiotic during the major portion of a three hour period, namely, 200,000 units. The study was designed to simulate the clinical application of oral penicillin to therapy and accordingly, 200,000 units of penicillin were given orally at 8 A. M., approximately a half hour before breakfast and again at 11 A. M., and 2 P. M. The third oral dose of antibiotic was taken purposely after a meal, a time considered to be unfavorable for the gastrointestinal absorption of penicillin. The subjects remained in the laboratory throughout a $3\frac{1}{2}$ hour observation period and blood samplings were done at $\frac{1}{2}$, $1\frac{1}{2}$, $2\frac{1}{2}$ and $3\frac{1}{2}$ hours after the 2 P. M. dose of 200,000 units. Just prior to the ingestion of the 2 P. M. dose of penicillin, the bladder urine was discarded and $3\frac{1}{2}$ hours later, a quantitative collection of urine was made for estimation of the urinary recovery of penicillin during this period. Injections of intramuscular penicillin were made in the right deltoid region at 2. P. M., without any priming doses such as were employed in the case of the oral penicillins.

Methods Employed

Blood samples were drawn into heparinized syringes, centrifuged, and the plasma pipetted

into serum vials. Plasma specimens were frozen at minus 20°C within thirty to forty minutes of the time of withdrawal of blood and held until assayed. Penicillin assays were done by both the Sarcina lutea cup-plate method and the Rammelkamp serial dilution method (using Streptococcus hemolyticus strain 98 and group 'O' human red blood cells).

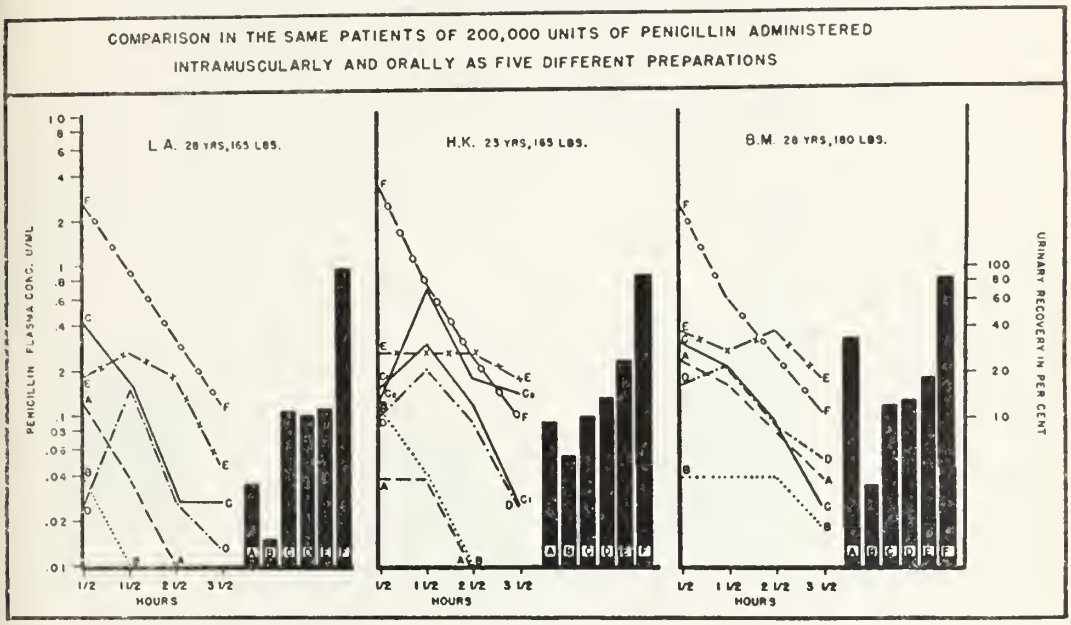
COMPARISON IN THE SAME PATIENTS OF 200,000 UNITS OF PENICILLIN ADMINISTERED
INTRAMUSCULARLY AND ORALLY AS FIVE DIFFERENT PREPARATIONS
L. A. 28 YRS, 165 LBS.
H.K. 23 YRS, 165 LBS.
B.M. 28 YRS, 180 LBS.
PENICILLIN PLASMA CONC. U/ML
URINARY RECOVERY IN PER CENT
HOURS

CHART I

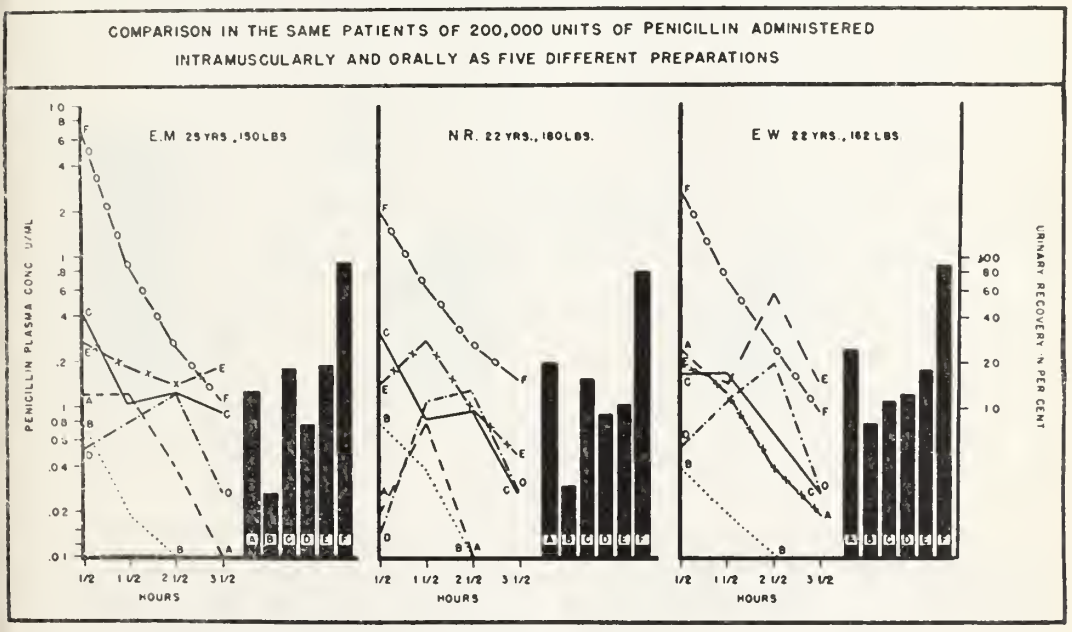
COMPARISON IN THE SAME PATIENTS OF 200,000 UNITS OF PENICILLIN ADMINISTERED
INTRAMUSCULARLY AND ORALLY AS FIVE DIFFERENT PREPARATIONS
E.M 25 YRS., 150 LBS
N.R. 22 YRS., 180 LBS.
E.W 22 YRS., 162 LBS.
PENICILLIN PLASMA CONC. U/ML
URINARY RECOVERY IN PER CENT
HOURS

CHART II

LIBRARY OF THE
COLLEGE OF PHYSICIANS
OF PHILADELPHIA

Results

The results are summarized in Charts I to V. In *Charts I and II* are presented the penicillin plasma concentrations and the urinary recoveries observed following the oral administration of the third 200,000 unit dose of five oral penicillin preparations and a single 200,000 unit intramuscular dose of sodium penicillin in aqueous solution, to each of the six subjects studied. Presentation of the data on individuals permits one to see the remarkable manner in which each one of the group has shown the same general response to the different preparations that was observed in the group as a whole.

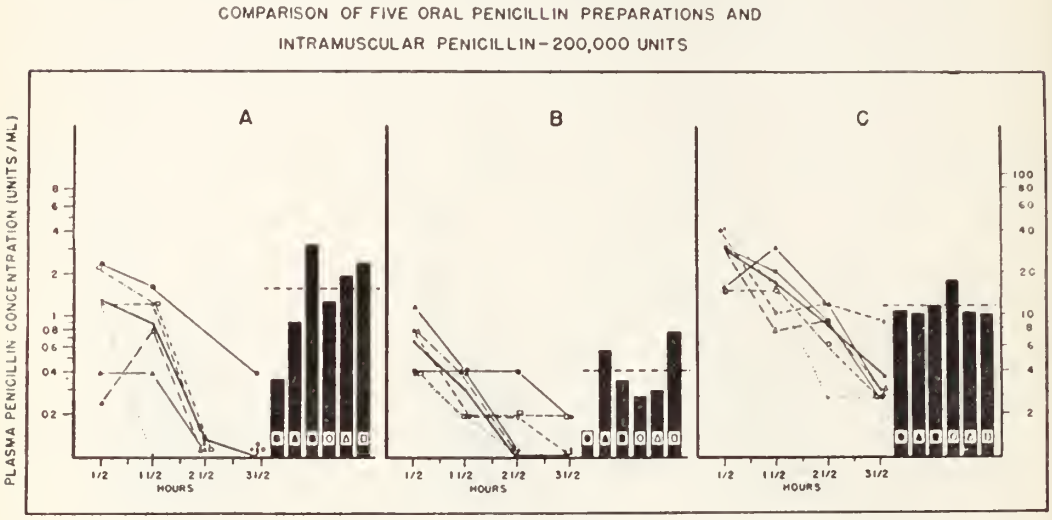

CHART III

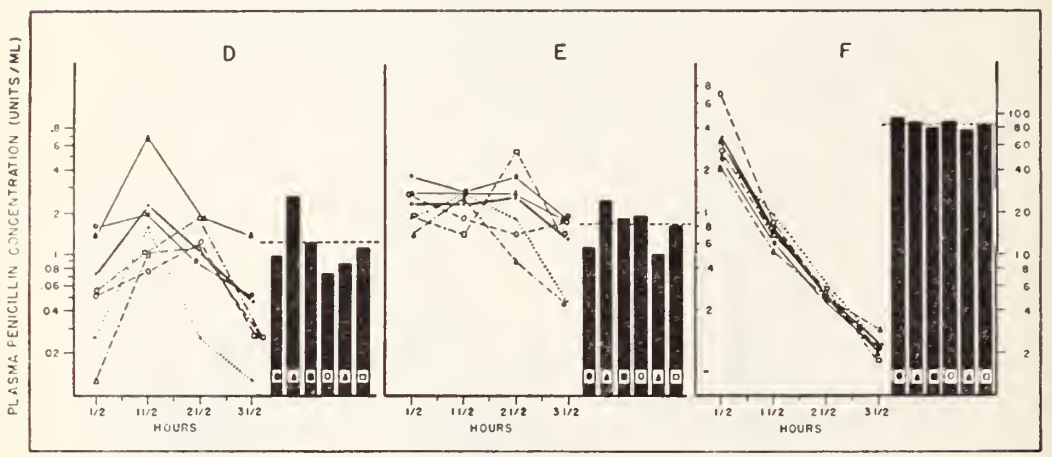

CHART IV

Charles III and IV permit the direct comparison of the penicillin plasma concentrations and the urinary recoveries resulting from the administration of the different preparations to the entire group of subjects studied. *Chart V* shows the average plasma concentrations and urinary recoveries of the entire group of six

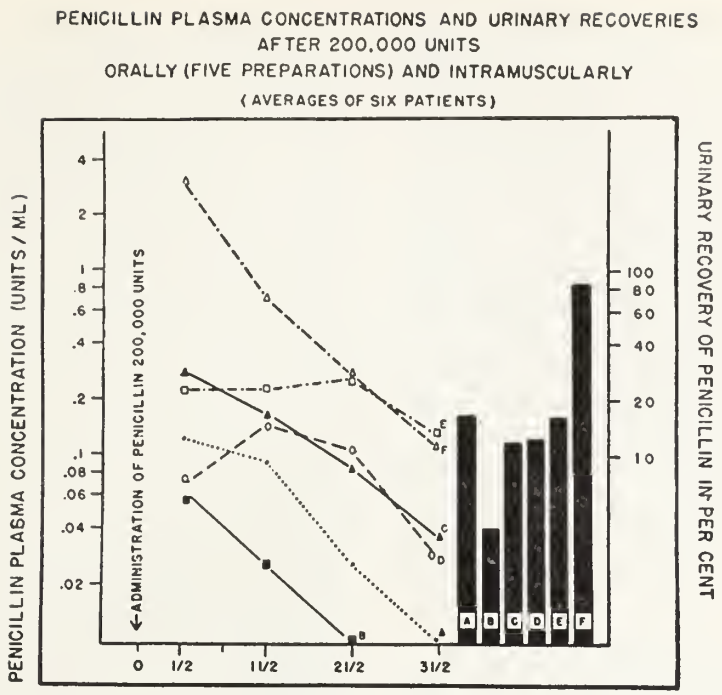

CHART V

patients with respect to each penicillin preparation investigated. The actual values plotted in Chart V are presented in *Table II*.

The results of this study have been statistically analyzed* and the results may be expressed in terms of statistical significance**. The subjects studied constituted a homogeneous group since the differences among patients were not significant. Graphic evidence in support of this statistical conclusion may be seen in *Chart IV-F* where the close agreement of results following the intramuscular injection of 200,000 units of penicillin is obvious.

The differences among the five oral preparations with respect to urinary recoveries showed that preparation B was highly significantly different from all other preparations, whereas A, C, D, and E showed no significant differences.

The differences among preparations with regard to plasma concentrations were highly significant. The mean plasma concentration of

TABLE II

AVERAGE PENICILLIN PLASMA CONCENTRATIONS AND URINARY RECOVERIES AFTER ADMINISTRATION OF FIVE ORAL PENICILLIN PREPARATIONS AND INTRAMUSCULAR PENICILLIN—200,000 UNITS

PREPARATION	PLASMA CONCENTRATIONS (U/ML.) Hours after Penicillin				URINARY RECOVERIES OVER 3½ HOURS. AFTER THIRD DOSE.	
	½	1½	2½	3½	Units	% of 200,000 Units
A	.126	.093	.026	.009	33,233	16.6
B	.065	.026	.007	.003	7,800	3.9
C	.296	.170	.087	.037	23,633	11.8
D	.068	.144	.108	.028	21,066	10.5
E	.233	.233	.263	.129	32,566	16.3
F	3.36	.750	.265	.113	170,166	85.1

* For the statistical analysis of these data, the authors are indebted to Mr. Joseph L. Ciminera, Research Biometrician, of the Medical Research Division of Sharp and Dohme, to Miss Gertrude M. Cox, Director of the Institute of Statistics, University of North Carolina, and to Dr. D. J. Finney, Lecturer in Statistics, Oxford University, Cambridge, England.

** Not significantly different means $p = >0.05$, significant means $p = <0.05$, and highly significant means $p = <0.01$.

A and B did not differ significantly and neither did those of preparations C and D. Collectively preparations A and B were highly significantly different from C and D collectively. Preparation E gave highly significantly different results than all other preparations.

The actual time-response curves of penicillin plasma concentrations of the five preparations were highly significantly different. Preparations A, B, and C gave progressively declining plasma concentrations with time, with the peak concentration at one-half hour, after the ingestion of the third dose of antibiotic. Preparation D had a maximum at $1\frac{1}{2}$ hour, and preparation E had a maximum value at $2\frac{1}{2}$ hours. With respect to any one of the five preparations studied the time-response curves of the six patients studied were not significantly different.

Discussion

The differences in the individual handling of orally administered penicillin, has convinced us that the only valid means of comparing oral penicillins is to do so in the same patients. Failure to establish this control can be cited as a major criticism of most of the literature on oral penicillin, indeed, this shortcoming is one reason for the uncertainty about the role of antacids in protecting penicillin.

Penicillin is destroyed in acid solution (11) (19), and more rapidly as the pH falls below 4 but a pH below 3 for at least 30 minutes is required to destroy any significant quantity of penicillin (4). It is doubtful whether penicillin in the stomach is exposed to a pH as low as 3 for this length of time in the majority of patients, but even if it is granted that some penicillin is destroyed by the gastric acidity, the length of time over which penicillin is exposed to the acid in the stomach, is not sufficiently long to account for the large fraction of an orally administered dose of penicillin that is not recovered in the urine. It would appear that undue importance has been given to the role of acid neutralization in the improvement of gastrointestinal absorption of the antibiotic, to the neglect of other probably more important factors.

The ingestion of food influences the dose time-response curve of oral penicillin, both in regard to lowering the concentrations that are achieved and in delaying the appearance of the peak concentration (11) (16) (20) (21). This influence is exerted apart from the stimulation of gastric secretion by food, for it has been demonstrated that food produces this effect in pernicious anemia patients with achlorhydria (9). It is quite possible that the type of food ingested determines the length of time during which penicillin is retained in the stomach and exposed to the destructive influence of acid, but whatever the explanation, the observations of delay in absorption and lowering of the resulting penicillin plasma concentration is consistently observed.

Investigations in experimental animals and in patients have indicated that the duodenum is probably the site of optimal absorption of penicillin and that absorption progressively diminishes thereafter (3) (11). It is of interest to note that penicillin dissolved in water or saline has repeatedly given plasma concentrations of penicillin as high and as prolonged as any observed after buffered or otherwise protected penicillin preparations (3) (9) (11) (15). We have employed penicillin dissolved in a pleasantly flavored and buffered vehicle and found that the resulting plasma concentrations were practically identical with those attained with preparations C and D. The normal functioning of the stomach is such as to provide for the rapid passage of liquids through the stomach into the duodenum and hence penicillin given in solution might be expected to be exposed for a minimal length of time to the destructive action of any acid present in the stomach. Thus, the rapid delivery of the administered dose of penicillin into the duodenum without destruction in the stomach might account for the good results obtained following the use of penicillin in this form. In this same connection, it is interesting that some of the highest and most consistent plasma

concentrations following the oral administration of penicillin have been observed when penicillin is taken in conjunction with 100 cc. of eggnog together with sodium bicarbonate (6). An eggnog is certainly food and a food that probably acts as a buffer, but it is also liquid and on this basis there is a great possibility that a large portion of the dose of penicillin administered in this form is rapidly transported into the duodenum, in much the same way as when administered in simple solution.

In an effort to account for some of the losses of penicillin observed following its oral administration, it has been postulated that penicillin is destroyed by penicillinase produced by various of the organisms found in the gastrointestinal tract (22). While this hypothesis is an attractive one, it can be discounted in part by the observation that penicillinase producing organisms are rarely found in the duodenum, the jejunum or even in the ileum (11). The claims of a beneficial effect as an inhibitor of penicillinase must therefore be accepted with reservation and certainly it has been convincingly demonstrated that neither sodium benzoate or benzoic acid exert any striking effects on the excretion of penicillin even when given in many times the dose represented by the amounts in the benzoate containing tablets used in this study (23).

An increasing body of evidence is accumulating to indicate that the principal reason for failure to recover more than a fraction of an orally administered penicillin dose is an actual difficulty in absorption of the antibiotic itself. By introducing penicillin solution into an isolated loop of a cat's duodenum, it has been demonstrated that 76% of the instilled antibiotic remains after an hour and 56% after 3 hours, as compared to the almost total disappearance within an hour of an instilled quantity of sulfadiazine solution (24). Enteric coatings of orally administered penicillin designed to disintegrate at varying levels of the gastrointestinal tract, result in progressively poorer absorption of the drug (11). Finally, it has been shown by studies with penicillin tagged with radioactive sulphur that approximately 59% of an administered dose of the antibiotic remained in the gut after 6 hours, during which time only 24% could be recovered in the urine (25). It seems clear, therefore, that one of the major reasons that a larger proportion of an orally administered dose of penicillin is not recovered in the urine is the difficulty of absorption of the antibiotic from the gastrointestinal tract. In an effort to alter the pattern of absorption of oral penicillin, it has been suggested that the co-administration of detergents might be useful in altering surface relationships within the gut and thereby favor penicillin absorption. A preliminary investigation carried out with Tween 80 has failed to indicate any favorable influence on the gastrointestinal absorption of sodium or aluminum penicillin (26).

In the study here reported, oral penicillin was administered purposely after a meal, a time at which the gastric acidity might be anticipated to be high in young healthy individuals, and blood samplings for the determination of penicillin plasma concentrations were done after the third oral dose of antibiotic. It was the feeling of the authors that samplings after the third dose of antibiotic would be a fair index of the plasma concentrations to be expected on a three-hourly schedule of therapy at the level of 200,000 units and that by sampling after a dose of medication taken after a meal, one of the adverse conditions to be expected in clinical practice would be anticipated.

It is of interest to observe that the statistical differences in the penicillin plasma concentrations with respect to time can be correlated with the relative solubilities of the penicillin salts employed. Preparations A, B, and C, containing extremely soluble salts of penicillin, gave peak concentrations at $\frac{1}{2}$ hour and thereafter the concentrations declined in a fairly regular manner. Preparation D containing procaine penicillin, a salt with a limited solubility, approximately 7,000 units per ml., showed a peak concentration at $1\frac{1}{2}$ hours, whereas

preparation E containing aluminum penicillin, an extremely insoluble salt of penicillin, except in alkaline solutions, gave a peak concentration at 2½ hours. While this is an attractive correlation of plasma concentrations with the solubility of penicillin salts, it would seem advisable to study the matter further before drawing final conclusions. It can equally well be said that the three preparations C, D, and E, which gave the highest plasma concentrations were all buffered preparations. One cannot avoid the conclusion that although the urinary recoveries following the use of preparations A, B, D, and E, were not statistically different, the resulting plasma concentrations were highly significantly different and the difference favored buffered preparations. There is no obvious explanation for this observation but it does pose the question, as to which is more important, from the standpoint of therapy, the amount of penicillin going through the patient or the manner in which it does so.

The observation has been made that after the repeated administration of oral penicillin there tends to be a cumulative effect during the first 24 hours of therapy (3) (27) (28) and also that there tends to be a downward trend of plasma concentrations during the day (8). In line with these considerations, the blood samplings in this investigation were done at a time when concentrations might be expected to be lower from the standpoint of the time of day but samples taken after the third dose of penicillin might be expected to show concentrations increasing by reason of an accumulative effect. We are inclined to believe that such an accumulative effect may be favoring aluminum penicillin more than the other penicillins under the conditions of this investigation, for we have other data indicating that at the end of 24 hours (after the 9th dose of 200,000 units), the penicillin plasma concentrations resulting from the administration of sodium and aluminum penicillin to the same patients are identical (26). Further investigation of this point is clearly indicated and this work is in progress at the present time.

Having demonstrated to our satisfaction that an oral dose of 200,000 units of any of five oral penicillin preparations results in therapeutically significant penicillin plasma concentrations for the entire 3 hour period between oral doses or the major portion thereof, it may be asked what the implications are with regard to therapy. It can be said at the outset that in terms of attaining a peak concentration of penicillin, oral penicillin cannot compete with that which is intramuscularly injected when the antibiotic is given in the same dosage by the two routes. With regard to the steady maintenance of therapeutically significant concentrations throughout the intervals of time between medication, it is probable that this end can be accomplished readily with oral penicillin without the use of inconveniently large doses. There is a limited acceptance of 0.03 unit per ml. as a therapeutic concentration and by this criterion, it is clear that all five of the oral preparations studied have given this concentration for the entire interval between the administration of doses or a large portion thereof. Indeed, this concentration is exceeded for the entire 3½ hour period by preparations C, D, and E. Reference to the literature on intramuscular penicillin indicates that a minimum dose of 50,000 units of sodium or potassium penicillin in aqueous solution would be required every 3 hours to achieve a minimum level of 0.03 for as long as 3 hours. Unfortunately, this small intramuscular dose of penicillin was not administered to the group of patients studied but in such a group of healthy young adults, it is quite problematical whether 50,000 units of intramuscular penicillin would have resulted in concentrations of 0.03 at the end of 3 hours. Since it has been shown that penicillin plasma concentrations are higher in sick and hospitalized patients than in healthy ambulatory ones (29), it would be anticipated that plasma concentrations resulting from 200,000 units administered every third hour would be considerably higher than were observed in our study group. Even though this anticipation were not fulfilled, there should be no hesitancy in treating the majority of com-

monly encountered infections that are amenable to therapy with 30,000 to 50,000 units of intramuscular penicillin every third hour, with 200,000 units of oral penicillin every third hour.

The data from this study permits a comparison of the urinary recoveries and the resulting plasma concentrations after 200,000 units of penicillin administered both by mouth and intramuscularly. Eliminating preparation B by reason of its statistically different behavior than the other preparations from the standpoint of its urinary recovery, (for which phenomenon we have no explanation), it can be stated that the penicillin recovered after the oral administration of 200,000 units was one-sixth of that recovered after the intramuscular administration of the same quantity of antibiotic. Actually the range of recovery was from

TABLE III

RATIO OF PENICILLIN PLASMA CONCENTRATIONS AFTER 200,000 UNITS INTRAMUSCULARLY AND ORALLY

PREPARATION	HOURS AFTER PENICILLIN			
	½	1½	2½	3½
F/AB	35:1	12:1	16:1	18:1
F/CD	18:1	5:1	3:1	3:1
F/E	14:1	3:1	1:1	1:1

$\frac{1}{5}$ to $\frac{1}{8}$ as much, *Table II*. This finding is in good agreement with the much quoted but little documented dictum, that penicillin should be administered by mouth in 5 to 10 times the dose administered intramuscularly. When plasma concentrations are compared in a similar manner, it is once more emphasized that intramuscular penicillin results in much higher concentrations at the $\frac{1}{2}$ hour period than can be anticipated from an equal quantity of penicillin taken by mouth. In the present study, the ratios were actually from 35 to 14 times as high as those attained by oral administration. The differences become progressively less with the passage of time, so that with the oral preparation, E, showing the highest concentrations, there was no observable difference at $2\frac{1}{2}$ and $3\frac{1}{2}$ hours. Certainly, this finding in itself justifies additional investigation of the merits of an insoluble salt of penicillin such as aluminum penicillin. The actual ratios of the concentration resulting after intramuscular administration of 200,000 units to those resulting from the various oral penicillin preparations are presented in *Table III*.

SUMMARY AND CONCLUSIONS

Five oral penicillins and intramuscular penicillin have been compared in the same patients at a level of dosage of 200,000 units. It has been established that on the basis of urinary recoveries over a $3\frac{1}{2}$ hour period, one-sixth as much penicillin is recovered after the oral as after the intramuscular administration of 200,000 units. The plasma concentrations after intramuscular penicillin have been shown to vary in their relationship to those after oral penicillins in a ratio from as much as 35 to 1, at a half hour after the administration, to a ratio of 1:1 three and a half hours after the administration of the antibiotic. Under the conditions of the investigation, highly significantly different plasma concentrations were obtained after the administration of preparations containing sodium and potassium salts of penicillin, procaine penicillin and aluminum penicillin. The number of individuals studied was small but the conditions of the investigation were rigidly controlled and the results have been shown to be highly statistically significant. Despite the statistical significance of the results obtained it should be emphasized that they should be interpreted as applying strictly to the conditions imposed for the purpose of this study.

REFERENCES

1. EAGLE, H., GUDE, A. V., BECKMANN, G. E., MAST, G., SAPERO, J. J., AND SHINDLEDECKER, J. B.: Prevention of Gonorrhea with Penicillin Tablets, J. A. M. A. **140:** 940–943, 1949 (July 16).
2. HOFFMAN, W. S., AND VOLINI, I. F.: Studies in the Oral Administration of Penicillin: II. Results of Treatment of Pneumococcic Lobar Pneumonia and Other Acute Infections with Several Oral Penicillin Preparations, Am. J. M. Sc. **213:** 520–534, 1947.
3. HOFFMAN, W. S., AND VOLINI, I. F.: Studies in the Oral Administration of Penicillin: I. Assays of

Various Preparations and the Determination of the Effective Therapeutic Dose, Am. J. M. Sc. **213:** 513–519, 1947.

4. McDermott, W., Bunn, P. A., Benoit, M., DuBois, R., and Reynolds, M. E.: The absorption, Excretion, and Destruction of Orally Administered Penicillin, J. Clin. Investigation **25:** 190–210, 1946.
5. Volini, I. F., Hoffman, W., Hughes, J. R., and Peffer, J. R.: Studies in the Oral Administration of Penicillin, Illinois M. J. **94:** 235–242, 1948.
6. Starkey, H., and Dixon, J. H.: Oral Administration of Penicillin, Canad. M. A. J. **59:** 47–50, 1948.
7. Crosson, J. W., Boger, W. P., Shaw, C. C., and Miller, A. K.: Caronamide for Increasing Penicillin Plasma Concentrations in Man, J. A. M. A. **134:** 1528–1532, 1947 (Aug. 30).
8. Murray, R., and Finland, M.: Pectin Adjuvant for Oral Penicillin, Proc. Soc. Exper. Biol. & Med. **62:** 240–242, 1946.
9. Finland, M., Meads, M., and Ory, E. M.: Oral Penicillin, J. A. M. A. **129:** 315–320, 1945 (Sept. 29).
10. Barach, A. L., Garthwaite, B., Oppenheimer, E. T., Forman, J., and Osburg, H.: Oral Administration of Penicillin, Science **102:** 247–250, 1945.
11. Stewart, H. C., and May, J. R.: Absorption of Penicillin Given by Mouth, Lancet **2:** 857–862, 1947.
12. Henderson, J. L., and McAdam, I. W. J.: Oral Administration of Penicillin to Infants, Lancet **1:** 922–925, 1946.
13. Heatley, N. G.: Administration of Penicillin by Mouth, Lancet **1:** 590–591, 1945.
14. Cohn, A., Kornblith, B. A., and Grunstein, I.: Oral Penicillin Treatment for Gonorrhea, Am. J. Syph. **30:** 485–489, 1946.
15. Free, A. H., Parker, R. F., and Biro, B. E.: Oral Penicillin, A Comparison of Various Modes of Administration, Science **102:** 666–668, 1945.
16. Meakins, J. C., Smith, F., and Gold, M. A.: A Comparative Study of Some Commercial Preparations of Oral Penicillin, Canad. M. A. J. **55:** 97–101, 1946.
17. Kitchen, D. K., Thomas, E. W., and Rein, C. R.: Serum Concentration following the Oral Administration of Crystalline Procaine Penicillin G and Crystalline Sodium Penicillin G, J. Invest. Dermatol. **12:** 147–149, 1949.
18. Boger, W. P., and Beatty, J. O.: Oral Penicillin: Comparison of Sodium and Procaine Penicillins in the Same Patients. To be published.
19. Rammelkamp, C. H., and Helm, J. D., Jr.: Studies on the Absorption of Penicillin from the Stomach, Proc. Soc. Exper. Biol. & Med. **54:** 324–327, 1943.
20. Broh-Kahn, R. H., and Pedrick, R. F.: Some Factors That Modify the Effect of Trisodium Citrate on the Absorption of Oral Penicillin, Am. J. M. Sc. **212:** 691–696, 1946.
21. Charney, J., Alburn, H. E., and Bernhart, F. W.: Urinary Excretion of Penicillin in Man after Oral Administration with Gastric Antacids, Science **101:** 251–253, 1945.
22. Reid, R. D., Felton, L. C., and Pittroff, M. A.: Prolongation of Penicillin Activity with Penicillinase-Inhibiting Compounds, Proc. Soc. Exper. Biol. & Med. **63:** 438–443, 1946.
23. Boger, W. P., and Baker, R. M.: A Comparison of Effect of Caronamide and Benzoic Acid on Penicillin Plasma Concentrations, Proc. Soc. Exper. Biol. & Med. **66:** 1–4, 1947.
24. Seeburg, V. P., Illg, P. L., and Brown, D. J.: The Intestinal Absorption of Penicillin G, Science **104:** 342–343, 1946.
25. Rowlands, S., Rowley, D., and Stewart, H. C.: Absorption and Excretion Studies with Radioactive Penicillin, Lancet **2:** 493–495, 1948.
26. Schwartz, L., and Boger, W. P.: The Lack of Effect of Tween 80 on the Absorption of Aluminum and Sodium Penicillins, J. Lab. & Clin. Med. **34:** 1443–1446, 1949.
27. Ross, S., Burke, F. G., and McLendon, P. A.: Penicillin by Mouth; Report of a Clinical Trial, J. A. M. A. **129:** 327–332, 1945 (Sept. 29).
28. Bushby, S. R. M., and Harkness, A. H.: Oral Penicillin in Gonorrhea, Lancet **2:** 783–787, 1946.
29. Boger, W. P., Oritt, J. E., Israel, H. L., and Flippin. H. F.: Procaine Penicillin G in Oil: I. Plasma Concentrations; Preliminary Observations on Its Use in Pneumonia, Am. J. M. Sc. **215:** 250–256, 1948.

Steps toward World Health and Security*

By JOHN H. ARNETT, M.D.

Associate Professor of Medicine, University of Pennsylvania Graduate School of Medicine, Philadelphia, Pa.

IT IS related in the Second Book of Kings that the King of Syria sent Naaman, the Captain of his host, to the King of Israel to be cured of his leprosy. No doubt before, and certainly since then, some form of co-operation between nations in matters of health has been practiced from time to time. Even before the advent of the League of Nations, the League of Red Cross Societies, the Office International d'Hygiène Publique, the International Opium Convention, the International Sanitary Conventions, the Pan-American Sanitary Organization, and many sanitary agreements between nations and groups of nations were functioning beneficially. It was natural, therefore, that a health organization should have been included among the specialized agencies of the League of Nations, and of the United Nations. As one peruses the publications of the health organizations of these two bodies, one is immediately struck by their similarity, as though the World Health Organization (WHO) had sprung, phoenix-like, from the ashes of its predecessor. This applies to the Weekly, Monthly and Annual Epidemiological Reports, the Bulletin, the Chronicle, and the official records of the two organizations. In function, also, there is a strong family resemblance. Each body began as an interim commission which later attained maturity, the functions of WHO being somewhat more ambitious, but otherwise similar to those of the League of Nations Health Organization. Neither was in any sense an international health service with enforcement powers, but rather a co-ordinating, expediting and informational body. This was necessarily so, since neither the League of Nations nor the United Nations was in any sense a government, but rather a league of sovereign states without law-making or law-enforcing powers. If, for example, the problem of the opium traffic in China, or the spread of typhus from Russia into Poland was under consideration, the permission and help of the Chinese, Polish and Russian governments had to be secured before any action could be taken. In the first instance, the Chinese delegate felt constrained to suggest that perhaps the liquor traffic in the United States deserved investigation equally with the opium traffic in China; while, in the second instance, the Russians apparently shunned the widespread dissemination of information regarding the prevalence of typhus and other diseases in their newly organized union. In spite of these difficulties, the League of Nations Health Organization in 1920 set to work on its sanitary program, in addition to which it later undertook to standardize biological products and tests, promote child welfare, and to facilitate the cheap supply of quinine, salvarsan, and other drugs, to health services which needed them. In accordance with these plans, the League of Nations Health Organization thus continued to meet, advise, study and publish, until the death of the parent organization on April 18, 1946.

In the meantime, the San Francisco Conference had beeen meeting, and on July 22, 1946, the representatives of all 51 states which were then members of the UN, and 13 nonmember nations, unanimously adopted the WHO constitution and set up an interim commission composed of representatives from 13 states. The constitution of the World Health Organization (1) defines health as "a state of complete physical, mental, and social well-being and not merely the absence of disease and infirmity".

*Read before the College of Physicians of Philadelphia, Section on Public Health, Preventive and Industrial Medicine, 5 April 1949.

It states its objective as "the attainment by all peoples of the highest possible level of health". It aims:

"To act as a co-ordinating authority on international health work; to establish and maintain collaboration with the United Nations specialized agencies and with governmental, professional, and other groups in the health field; to stimulate and advance work to eradicate epidemic, endemic, and other diseases; to promote the prevention of accidental injuries; to promote the improvement of nutrition, housing, sanitation, recreation, economic or working conditions, and other aspects of environmental hygiene; to promote maternal and child health welfare; to promote research in the field of health; to promote improved standards of teaching and training; to foster activities in the field of mental health; to study and report on administrative and social techniques in the health field; to establish and revise international nomenclatures of diseases, causes of death, and public health practices; to standardize diagnostic procedure; and to develop, establish and promote international standards with respect to food, biological, pharmaceutical and similar products."

During the two years of its existence, the Interim Commission, under Dr. Stampar of Yugoslavia, was of signal service in helping the Egyptian Ministry of Health to bring the 1947 cholera epidemic under control. Accomplished within 6 weeks, this is said to be the first time in medical history that a cholera epidemic spreading at the rate of 1000 cases a day has been checked in so short a time. Anti-malaria campaigns in Italy and Greece are under way, only 30 deaths from this disease being reported in 1947 for Italy and Sicily as compared with 250 in 1946 and 360 in 1945. Similarly, the incidence of malaria has diminished 80% in Greece. A campaign for the elimination of tuberculosis through the following methods has been begun; prevention, case finding, isolation and medical care, rehabilitation and after care, and social and economic protection of afflicted families. 50,000,000 European children are being examined for tuberculosis, and it is estimated that 15,000,000 of these, who have not contracted the disease, will be given BCG vaccine. Teams have been sent to China, Ethiopia and Greece to demonstrate the use of this vaccine, and since it is not practical to ship this material to India, a laboratory is being set up in that country to train personnel in its manufacture. Plans for a wide-spread campaign against syphilis are under way, with emphasis on its early diagnosis and treatment with penicillin. This is especially needed in Ethiopia, in some areas of which the incidence of syphilis is estimated at 80%, and physicians are rare.

WHO in many parts of the world inherited field operations from UNRRA in 1947, and, at the request of the governments concerned, medical missions ranging from 2 to 32 persons are being maintained. Their activities, in addition to anti-malaria, anti-tuberculosis and venereal disease programs, include assisting local authorities in maternal and child care, plague, cholera, kala-azar control, and planning improved water supply systems. More than 245 fellowships have been awarded to public health and medical specialists in war devastated countries, so that they can study outside their native lands. Of these, 135 were assigned to the United States and Canada. Two laboratories prepare and distribute samples of standardized biologicals such as Vitamin E, heparin and penicillin. The expert committee has also established a plan for setting international standards for cholera and whooping cough vaccine, scarlet fever antitoxin, diphtheria and tetanus toxoid, blood groups A & B, the Rh factor, digitalis, and purified tuberculin.

The WHO budget for 1950 is $7,501,500, with a supplementary operating budget of $10,624,410, the amount of expense being equitably distributed among the participating states. It is hard to understand, therefore, why Russia should have announced on February 16, 1949 (3), that because of dissatisfaction with the work of WHO, and for reasons of economy, she was withdrawing. It would appear that a good start had been made toward

world health, and that a health levy on one nation equalling only that of 2 or 3 bombers was not exorbitant.

What of the future of WHO? This depends, of course, upon the future of the UN, which, in turn, is in the lap of the gods. As Toynbee, in his "Civilization on Trial" points out, "associations of this loose-knit type have never proved stable or lasting in the past". The Holy Alliance, in spite of the idealistic principles which actuated its founders, began crumbling almost immediately. The League of Nations began to crack after a few years, and was officially buried at the age of 26. While it is hoped that the life of the UN will be longer, we have no convincing reason for believing that such will be the case. The most urgent problem, therefore, whether from the standpoint of statesmanship, economics, or of preventive medicine, is the preservation of the UN and the prevention of that atomic and bacterial war which casts its dread shadow over our lives, our homes and our institutions. Its eruption will probably engulf both victor and vanquished in ruin. So stupendous are the sacrifices required even to prepare for such a conflict, that some authorities foresee only bankruptcy and dictatorship in store for that nation which attempts to put into operation a full-scale program of military preparedness. Furthermore, scientists and military leaders alike express doubts as to the efficacy of any kind of military preparedness in affording security against any enemy attack with modern weapons of mass destruction. Albert Einstein has put the matter in a nutshell when he says: "Our defense is not in armaments, nor in science, nor in going underground; our defense is in law and order."

As leaders of thought in the community, the cause of citizenship, science and preventive medicine suggests that we pause from our immediate tasks long enough to reflect upon these matters and to consider whether perhaps law and order can not be secured between nations as it is between states and individuals, namely, by the delegation of certain powers to a central government which is vested with the duty and authority of enforcing certain stipulated regulations. Neither Hitlers nor Tojos can be stopped by agreements such as the League of Nations or the UN, but only by the strong arm of the law acting upon them as individuals. The human race has learned by bitter experience that there can be no peace without justice, no justice without law, and no law without government to make, interpret and enforce that law. The application of this dictum to the League of Nations and UN is obvious. A brief perusal of the Covenant of the League of Nations and of the UN charter is sufficient to convince anyone that whatever their merits may be, these organizations were never vested with the essentials of government. No doubt, the reasons for this omission seemed compelling to their framers, but the advent of weapons of mass destruction and planes of supersonic speeds have outmoded those reasons. The need for strengthening the UN into a federation which is capable of enacting, interpreting, and enforcing world law for world peace before it is too late is becoming so obvious that at the present time there is a movement on foot for the introduction of a Congressional Resolution which shall state, "It is the sense of the Congress that it should be a fundamental objective of the foreign policy of the United States to support and strengthen the United Nations and to seek its development into a world federation open to all nations with defined and limited powers adequate to preserve peace and prevent aggression, through the enactment, interpretation, and enforcement of world law".* If the American public makes clear to its representatives that it regards the passage of this resolution as essential, a chain of events will be set in motion which could lead shortly to an announcement from

*On June 7, 1949, this Resolution (H. C. Res. 64) was introduced into the House and subsequently was sponsored by 104 Representatives. On July 26th an identical resolution was introduced into the U. S. Senate and has obtained the support of 22 Senators. On July 8th and 26th two other resolutions bearing the aegis of Ely Culbertson and Clarence Streit, for a World Alliance and an Atlantic Union, were introduced into the Senate.

Washington of a new foreign policy, then to discussions between our own representatives and those of the other members of the United Nations, then to the consideration of the question of world federation by the UN Assembly, and finally to the calling of a review conference, and the recommendation by that conference of such changes in the UN charter as are necessary to achieve a world federation. Up to this point the pathway toward world federation seems to be clearly enough blazed. However, from this point on pioneering statesmanship will be required, just as it was when the representative of 13 sovereign and acrimonious colonies met in Philadelphia in 1787 to modify *their* charter (otherwise known as The Articles of Confederation). Washington's words at this juncture carry both encouragement and inspiration to us today. He is quoted as saying: "It is too probable that no plan we propose will be adopted. Perhaps another dreadful conflict is to be sustained. If, to please the people, we offer what we ourselves disapprove, how can we afterward defend our work? Let us raise a standard to which the wise and the honest can repair; the event is in the hand of God."

This brief sketch has presented some of the steps already taken by the human race towards its health and security. An analogy to the first faltering steps of childhood might not be too far-fetched. Perhaps humanity has attained sufficient experience and maturity to tear itself away from the time-honored vicious circle of international anarchy and recurring wars. If not, the outlook for public health and preventive medicine, and, indeed, for civilization itself, is grim.

REFERENCES

1. Chronicle of the World Health Organization, 1947, vol. 1, no. 1–2, p. 13.
2. New York Herald Tribune, Feb. 17, 1949.

Memoir of Joseph Spragg Evans

By WILLIAM S. MIDDLETON

Joseph Spragg Evans, Jr., son of the Reverend Joseph S. Evans and Ruth Ann (Pierce) Evans, was born in West Chester, Pennsylvania, March 6, 1875. He died in Madison, Wisconsin, February 3, 1948.

Dr. Evans received his B.A. degree from Haverford College in 1895. He graduated from the University of Pennsylvania School of Medicine in 1899. After a six months houseship at Germantown Hospital, he spent sixteen months at The Hospital of the University of Pennsylvania. Unusual opportunities in graduate study were afforded in Berlin, Vienna and Paris. In Vienna, a year was spent in the bacteriological laboratories of Weichselbaum, while in Paris he was afforded an opportunity of studying at the Pasteur Institute under Metchnikoff for a short period. Upon his return to Philadelphia in 1902 he entered upon the private practice of medicine and continued his academic interests as Instructor in Clinical Medicine in the University of Pennsylvania School of Medicine. His interest in bacteriology and immunology found expression in an associateship in the William Pepper Laboratory of Clinical Medicine between the years 1902 and 1909, when he left his adopted city.

The movement to Wisconsin was undoubtedly motivated by the challenge of widened opportunities as advanced by an earlier associate, Dr. Mazyck P. Ravenel, who had himself moved to the University of Wisconsin from Philadelphia. Arriving in Madison in February, 1910, Dr. Evans was destined to evolve and lead the clinical developments in the University of Wisconsin. The first step in this direction was the establishment of the Student Health Service of which he became the Director. The Student Infirmary was the natural outgrowth of this nucleus in a two-year school. Enlisting the support of the most influential citizens of the state, Dr. Evans was almost independently responsible for the diversion of excess sums from the Soldiers Rehabilitation Fund to the construction of a memorial in the form of the State of Wisconsin General Hospital. Invaluable in the implementation of this design was the support of Governor Emanuel Philipp, his close personal friend. With the realization of this long-time ambition, Dr. Evans' title was changed from Professor of Clinical Medicine to Professor of Medicine and Chairman of the Department of Medicine. He was likewise physician to the State of Wisconsin General Hospital. These composite positions he held until his retirement in 1945.

One of the most important elements in the assured success of the full medical course at Madison upon the addition of the clinical years was the preceptorial plan. This extra-mural activity had been the brain child of the late Dean Charles R. Bardeen, but it required the vitalizing human touch of Dr. Evans for full consummation. To this area he gave fully of his energies and talent for organization. The recapture of the important elements of the old apprenticeship system in medicine depends in no small measure upon this supreme effort.

In the broadest sense of the term, Dr. Evans was a medical statesman. Possessed of a charming personality, he dominated every gathering to which he lent his presence by his easy grace and gentility. Kindly and gentle by nature, his indomitable courage and steadfastness to high medical ideals vigorously resisted and overcame apparently insuperable obstacles to medical development in the Middle West. His inherent kindliness which pervaded every sick-room upon which he was attendant, brought untold comfort to the afflicted. His wise counsel was sought by people in all strata of society and his sympathetic ear was open to the humble as well as to the mighty.

Dr. Evans maintained that medicine as a part of the body politic should participate actively in public affairs. Reflecting this attitude, he personally served as a member of the State Council of Defense of Wisconsin. He was Chairman of the State Medical Section of the National Council of Defense. He served on the staff of Governor Philipp as Medical Adviser during World War I. In the area of medical activities, Dr. Evans was a member of the American Medical Association and its constituent groups. He was a member of Alpha Omega Alpha, Sigma Xi, and the Military Order of Loyal Legion. He was likewise a Fellow of the American College of Physicians and was Acting Governor for Wisconsin in 1945. No society membership did he treasure more highly than his Fellowship in the College of Physicians of Philadelphia. Indeed, to the end the Philadelphia tradition prevailed.

While Joseph Spragg Evans, Jr., will be long remembered as the adopted son of Wisconsin who lent his superior talents so effectively to the development of clinical medicine in the University of Wisconsin, his qualities of human understanding will more directly affect a legion of friends in the East and Middle West who will recall the engaging presence and kindly word of the true physician. Much as we may regret his early detachment from an area of productive scholarship that might have been expected from his basic training, the memory of Joseph Spragg Evans will be treasured in Wisconsin as the true sculptor of the clinical development in the University of Wisconsin Medical School.

The Role of Disease in the 70,000 Casualties in the American Revolutionary Army

By JAMES E. GIBSON

NO HISTORICAL event is more vividly impressed upon the memory of Americans than the seven years of war for Independence, with the figure of a poorly clad, unshod soldier, huddled beside a Campfire at Valley Forge, as a symbol of suffering that was endured.

Very few realize that an even greater threat to success than a well equipped English Army, was the continuous presence of the Grim Reaper, who, abetted by contagious diseases, accounted for ten times more deaths than British guns.

Handicapped by insufficient hospital facilities and attendants, sickness was never under control. Exposure, undernourishment and neglect of sanitation, developed many latent disorders that sent soldiers into hospitals. Here, bedded side by side with smallpox and typhus patients and exposed to contagion, they had but little chance to escape becoming victims of one of the infections. A foreboding of what might happen if hospitalized, caused many a sick soldier to desert.

Straw for bedding was so scarce that regular change was impossible, even when fouled or contaminated by bed bugs and body lice. Unattended patients, too weak to rise for nature's demands, often lay in their own filth.

In one of the Bethlehem hospitals, it was recorded that five patients died on the same straw before it was changed, and several of these victims had been hospitalized for only a slight disorder.

Looking backward from present day medical practice to conditions existing throughout the Revolutionary War, a tragic picture is presented.

Smallpox and typhus were the two most dreaded diseases of the American Army, though a malignant dysentery in a form now seldom encountered, also took a heavy toll.

Smallpox was a contagious affliction fairly well understood by Colonial medical men, but resorting to inoculation was a controversial subject. Many of the Colonies had laws punishing the practice with fines and imprisonment, while a few permitted the treatment in specified towns under strict regulations. Opposition to inoculation can be attributed to unfounded prejudice and ignorance of its efficiency, for records later assembled proved that only one person in three hundred died when submitting to the treatment, in comparison to one-sixth of those attacked by smallpox germs through sinus and lungs.

Revolutionary War physicians classified fevers under many different names, and the distinction between some of them is still a mystery. Their nomenclature included: "Slow; Intermitting; Intermittant; Malarial; Autumnal; Inflamitory; Billious; Putrid; Camp; Jail and Typhus." Typhoid fever had not yet been identified as such, but was undoubtedly present, possibly masquerading as either Camp or Jail. Typhus was easily recognized by purple spots and sores that developed on the body. Dr. James Tilton, who experienced an attack when stationed at Princeton, wrote that his tongue was covered by a crust to the thickness of a knife blade, and that it was black as soot.

Dysentery appeared at Cambridge in the early days of the Camp, and continued throughout the war. It was a debilitating infection of a malignant type seldom encountered today. The disease caused many deaths and permanently incapacitated a large number of soldiers.

The Massachusetts Council, anticipating the possible appearance of smallpox among the

troops, directed that a hospital be designated for the eventuality, shortly after the Battle of Bunker Hill.

When General Washington arrived at Cambridge on July 2d, 1775, he found 9½ percent of the Army either sick or unfit for duty. Three weeks later he reported to Congress:

"I have been particularly attentive to the least symptom of Smallpox, and hitherto we have been so fortunate as to have every person removed as soon as possible not only to prevent any communication, but any alarm or apprehension it might give in the Camp. We shall continue the utmost vigilance against this most dangerous enemy."

Dr. John Morgan was elected to replace Dr. Church as Medical Director in New England on October 16th, 1775, but he failed to report at Cambridge until a month later. After inspecting existing Regimental Hospitals, he recorded the presence of "Automnal" fever; some typhus and considerable smallpox, but said by shutting off all communication, the Army had escaped contamination.

On November 27th, 1775, General Washinton reported Boston was rife with smallpox, and that General Howe had ordered 300 of the citizens to leave. Washington was apprehensive that they might carry the smallpox germs, and forbade their approaching the Camp. Several days later he notified the Massachusetts Council that he had learned these 300 evacuees had been inoculated before leaving, with a design of introducing small pox among the American soldiers. In sending this news to Congress, the Commander in Chief wrote:—

"The information I have received of the enemy's intention of spreading Smallpox among us, I could not suppose them capable of, but I must now give some credit to the report, for it has made its appearance on several of those who last came out of Boston."

Washington later wrote that Howe considered the prevalence of smallpox in Boston to be a surety against an American attack.

Expiring enlistments greatly reduced the number of Washington's force, but by the end of February, 1776, he had been sufficiently reinforced to plan an offensive. By March 9th, 18,410 were enrolled, but of that number 15% were unfit for service, though relatively few were seriously ill. Dorchester Heights was then seized and fortified, and as it commanded Boston, Howe was confronted with the choice of either fighting or abandoning the town. The British decision was to withdraw, but they notified Washington that if molested while doing so, they would burn the city. Howe was then allowed to leave by sea, and three days later 1000 American soldiers, immune to smallpox, marched into Boston. Immediately afterwards Washington left for New York, leaving only 300 sick behind.

Cambridge was a comparatively healthy Camp during the entire period of its occupancy. Benjamin Rush credited its escape from epidemics to the similarity of customs, food and living conditions of the men then composing the Army.

Shortly after General Washington assumed command of the Army, he conceived a plan to engage the British stationed in Canada, and two expeditions were organized for that purpose.

Troops to the number of 2000 were enrolled under General Schuyler to advance via the Upper New York Lake region and attack the enemy at St. Johns, Cambly and Montreal. Very few physicians were attached to this organization, and when sickness reduced the number to 500, General Schuyler sent an urgent appeal to Congress for reinforcements, medical men and much needed hospital supplies.

Illness compelled Schuyler to relinquish his command to General Richard Montgomery, who with the force increased to 2000, captured Cambly on September 24th, 1775; St. Johns on November 3rd, and compelled Montreal to surrender on November 12th. Then, again the Northern Army was reduced to 500 fighting men by expiring enlistments, sickness and desertions.

While Schuyler was organizing his campaign

in Upper New York, Benedict Arnold gathered a hardy band of approximately 1100 men to march toward Quebec through uncharted New England forests and by way of available streams. The hardships and difficulties encountered and overcome, comprise one of the epics of the Revolutionary War history. Only a few of the men died while en route, but many suffered from attacks of dysentery, pneumonia and rheumatism. As winter approached with snow storms to impede progress, it became necessary to make Camp for a rest, and to build a crude hospital for the sick. A number of the force weakened by extreme cold and exposure, with others distressed by physical exhaustion, decided to turn back, so when the Americans crossed the St. Lawrence, only 600 of the original force remained. Arnold then sent an appeal to New England for reinforcements; made Camp and waited for Montgomery to join him from Montreal. This addition to Arnold's force was very small, consisting of only 300 men. But to add to that disappointment, they unknowingly brought germs of the dreaded smallpox. Five days later, the disease made its appearance, and a smallpox hospital was opened. In spite of having only 675 soldiers fit for service, the Quebec Citadel was assaulted on New Year's day of 1776. The result was disastrous; Montgomery was killed; Arnold incapacitated by a bullet in his knee, and most of the Officers, with 383 of the soldiers, were made captives. The small remaining force quickly withdrew; made Camp, and waited promised reinforcements from Massachusetts and New Hampshire.

On May 1st, 1776, 1900 American soldiers confronted the British at Quebec, but of that number 900 were smallpox patients, and 200 of the remaining 1000, had been ordered under inoculation. Many of the 900 victims had contracted the disease in the natural way, resulting in a greater severity of the epidemic. Officers and men became panic stricken and began inoculating themselves contrary to general orders.

In the midst of this distress and confusion, two British Warships arrived, and when 1800 English soldiers disembarked and immediately marched out to give battle, consternation seized the Americans and the entire force fled, abandoning stores, guns, equipment, and even clothing. Hospitals were left unattended and every patient able to leave his bed, joined the fleeing mob. The retreating Army stretched out over thirty miles and only halted when it reached Sorel, eighty miles from Quebec. Here they joined two Pennsylvania Brigades.

The Sorel Camp, located on low ground at the water's edge, proved a very unhealthy location. Smallpox immediately spread, becoming a violent epidemic, and 20% of the force reported sick.

A Congressional Commission, which included Franklin and Adams, had arrived at Headquarters, and Arnold sought and obtained their approval of a plan to inoculate the entire Army, treating one Regiment at a time. A directive was issued only to be countermanded by the Supreme Commander, who threatened death by a firing squad to any one applying for or receiving the treatment. This officer, General Thomas, was himself immediately stricken, and within five days became a casualty to his own insane stubbornness and prejudice.

The Congressional Committee reported to Philadelphia that the force in that particular Camp did not exceed 4000 men; "that $\frac{3}{4}$ of the entire Army have not yet had the Smallpox and that words were not strong enough" to describe the miserable situation.

The arrival of a British fleet off Sorel obliged Arnold to withdraw his men from Montreal, but as many of them were hospitalized by smallpox, the evacuation was slow and difficult. There were also 3000 sick stationed at nearby St. Johns and Cambly, and Arnold reported 31% of the combined force being unfit for duty.

General Schuyler notified Washington there were Regiments in Canada with every single man incapacitated by sickness, and said that if the Militia being sent North had not already gone through the inoculation treatment, they

would weaken rather than strengthen the Army.

Colonel Trumbull, commenting on conditions, remarked that he had not looked into a tent or hut without seeing a dead or dying man, and one of the physicians wrote home "he had wept until he had no more power to weep."

When Arnold completed the American withdrawal from Montreal, St. John and Cambly, General Schuyler ordered them to continue their march until they reached Crown Point on Lake Champlain. Bancroft has recorded that these half-naked men were broken in spirit, without discipline, and too weak to beat off an assault from the enemy. John Adams' comment was: "The Smallpox is ten times more terrible than the British, Canadians and Indians all together. This was the cause of our precipitate retreat from Quebec"; together with: "Our Army at Crown Point is an object to fill a human mind with horror."

During the previous three months, the American loss by disease and desertions was 5000, and 2000 of 5000 men still enrolled were sick.

When Dr. Jonathan Potts reported for hospital duty at Fort George in July of 1776, he found 1000 patients with smallpox, dysentery, Bilious and putrid fevers, and there were only four physicians and four mates in attendance. By September nearly 50% of the Northern Army was reported unfit for duty. This desperate situation caused great anxiety throughout all the Colonies and a real danger existed that a continuation of hospital conditions and dangers might result in a cessation of all enrollment. Governor Trumbull of Connecticut wrote: "Our men dare to face the British but are not willing to go into a hospital."

Dr. Lewis Beebe, of Massachusetts, began a Journal in May of 1776, in which he recorded that "language could not describe what the soldiers were enduring, and that no mortal would believe it unless they were eye witnesses." He wrote that nearly every tent contained one or more in great distress, calling for relief, and that death was no more regarded than the singing of the birds. He recorded that one of the Regiments was in a desperate condition, with between four and five hundred down with the smallpox. He said blasphemy was heard on every side, and that it was enough to bring down the vengeance of an Angry God; that many soldiers ridiculed the Bible; laughed at death; mocked at Hell and challenged the Diety to remove them from this world. He told of a violent storm that flooded tents, and of one man, all alone, a smallpox victim, who drowned because he was too weak to move. One of the hospitals Beebe attended had 700 patients and 300 new graves alongside. A distressing scene he witnessed was in a hospital so infested that he saw a large maggot crawling out of the ear of a sick soldier, with many more on his body.

These are but a few of the distressing situations experienced in the North during the years 1775 and 1776.

Previous to the Army's retirement to Crown Point, a hospital had been established at Fort George, and another at Ticonderoga where 3961 men, or 40% of the entire Camp were reported as ill. It was from this Post that Colonel Wigglesworth wrote that half his Regiment was unfit for duty, and said: "It would melt a heart of stone to hear the moans, and witness the distress of the sick and dying."

Responding to a demand from all the Colonies, and faced with a threat from some to withhold reinforcements, Congress provided for a complete reorganization of the Hospital Department. In the Spring of 1777, an adequate rate of pay was authorized, sufficient to sustain abandoned families, and many medical men then enrolled. Congress also appropriated sufficient funds to purchase essential hospital supplies. The result was that when the Northern Army resumed its offensive against General Burgoyne, sickness was for the first and only time during the entire war, kept under control.

The assembling of a large force in the summer of 1776, of men recruited from different Colonies, introduced a new insecurity for typhus fever then made its appearance. To in-

crease the problem it created, were the many wounded resulting from battle in the New York area. Evacuation of the sick and wounded was accomplished in advance of Washington's retreating men, but it caused Dr. Morgan to wish for a cartel arrangement with the British, by which all hospital patients and their attendants might be considered non-combatants, and not subject to capture and retention as prisoners of war.

By the time Washington crossed the Delaware River, the sick and wounded were distributed among newly established hospitals at Philadelphia, Allentown, Easton and Bethlehem, where the Headquarters of the group were located. Smallpox and typhus then raged, causing many soldiers' deaths, as well as citizens of the towns. In Philadelphia 2000 expired, and many were interred in mass graves where Washington Square is now located.

Success at Trenton and Princeton put new heart and hope in the Colonists, and recruits flowed into the Camp that Washington established at Morristown. Here again smallpox became an epidemic, and on February 16th, 1777, Congress in session at Baltimore, directed the Commander-in-Chief to arrange for the inoculation of all enrolled troops as well as recruits, before they reported for service. The following day, Dr. Shippen ordered Bodo Otto to set up a hospital for the purpose at Trenton in the "Old Barracks", which had been built to house British Troops during the French and Indian War.

The American Army then numbered 17,449, but 4745 or 26% of the whole force were in hospitals or unfit for duty.

The Battle of Brandywine and Germantown followed, and the resulting wounded were sent to newly created hospitals in the Pennsylvania Counties of Chester, Lancaster and Berks, as well as to existing ones at Trenton and Princeton. Smallpox and typhus soon broke out among these wounded and many deaths occurred.

Contrary to a common belief, there was comparatively little serious illness among Valley Forge soldiers during the early days of the encampment. There were, however, many needing hospitalization, the result of exposure, lack of warm clothing, and proper food. A large, newly constructed hospital headquarters, with Dr. Bodo Otto as Director, was created at Yellow Springs, and many neighborhood barns and churches were commandeered to shelter the sick. Some cases of smallpox and typhus were immediately reported, but their number was not a great problem until the month of March. Between that time and June, when the Army broke Camp, both diseases became epidemic and caused many deaths. It has been written that the drums and pipes playing the Dead March were constantly heard, and that wagons carrying food into the Camp were always returned via Yellow Springs fully loaded with sick soldiers.

On March 22nd, 1778, Dr. Cochran, of Washington's Staff, notified Dr. Potts, the Purveyor General, that a large number of recruits who had not had the smallpox, were expected and would be inoculated. He wrote: "Molasses in abundance will be needed for that purpose." A month later he again wrote of only having enough to last for one more day, adding; "and there was at least 1000 under inoculation." Just what use molasses played in the treatment, is a question present day medical men seem unable to answer.

Every hospital requisition for medicines contained a demand for many Pipes of wine for fever patients. Dr. Potts recorded that the amount he spent for wine exceeded that needed for bread during the whole war.

Shortly after Valley Forge was evacuated, neighborhood hospitals were abandoned and the remaining patients concentrated in the Yellow Springs headquarters building. This hospital was maintained until late 1781, under Dr. Bodo Otto assisted by two sons, to serve soldiers hospitalized by chronic disorders.

Following the battle of Monmouth, Washington reestablished his Camp at Morristown and in the Hudson Highlands, which necessitated a transfer of hospital facilities to those neighborhoods. Some log huts were constructed for the greater comfort of the soldiers, and

though the men suffered from lack of warm clothing and shortage of food, there was only a little sickness reported. Some cases of putrid fever were mentioned, and one return from the West Point hospital recorded them as being so malignant as to baffle the skill of the medical staff.

Dr. Thacher wrote that this winter was the most severe and distressing of any yet encountered, and though the soldiers were in great need of essential supplies, they were comparatively healthy but many were troubled by nostalgia.

Monmouth was the last important battle fought in the Northern Colonies, but as the British had concentrated 38,000 soldiers at New York, Washington found it advisable to increase his Army to 32,000.

In September, 1779, the enemy experienced an influenza epidemic at New York, which spread so rapidly that 6000 were infected during a six weeks' period.

Influenced by a belief that the South was in great part still loyal to the Mother Country, the British decided to transfer their offensive to that locality.

Washington considered this possibility as early as 1777, and had written to Governor Patrick Henry suggesting the Virginia law prohibiting inoculation be repealed, observing that he knew smallpox to be more destructive than the sword, and that he shuddered when he reflected that the vicissitudes of war might carry the fighting into some of the Southern States.

The American Force assembled to confront the enemy in the South was in poor physical condition; without discipline, and lacking equipment. General Lincoln was given the command and forced to surrender Charlestown in March, 1780, with 2300 soldiers and 250 officers, 19 of whom were medical men. General Gates succeeded Lincoln, and his force was practically annihilated at Charlotte, with 1000 lost as prisoners of war. The fight at Camden was equally disastrous, for the entire American Army was captured, including every hospital and all of the medical personnel.

Dr. Hugh Williamson, of North Carolina, reported that after the Battle of Camden he entered the enemies' lines under a flag of truce to ascertain conditions among the American captives. He then addressed a letter to the British Chief Physician, saying it appeared that Lord Cornwallis had not yet given any attention to the sick and wounded prisoners; that he had found it impossible to render relief to 240 of them, suffering from 700 wounds. Williamson further wrote that smallpox had broken out in the British Camp, and his request for permission to inoculate the American prisoners had been refused. The doctor then addressed a communication direct to Lord Cornwallis, and consent was eventually obtained. Williamson found that four hundred Americans were involved, and further that of 1900 captives, 800 had already died. All of the prisoners were in great distress, in need of clothing and food; especially those held on ships in the harbor, where they were exposed to a smallpox and typhus epidemic. This suffering was so great that 530 sought relief by enlisting in the British Army. When a general exchange of prisoners was arranged in 1781, only 740 of the American captives were still alive.

The Southern Army suffered through the entire campaign from lack of essentials and from the constant presence of malaria and dysentery. When General Greene relieved Gates of the Command, he wrote General Washington:

"Nothing can be more wretched and distressing than the present condition of the troops; hungry, starving and cold; without tents or equipment. Those in the Virginia Line are literaly naked and a great part of the whole force is unfit for any kind of duty. All will remain so until clothes can be sent from the North. I have written to Governor Jefferson not to forward any more men unless they are well clothed and properly equipped."

The British Army was afflicted with the same sickness that prevailed among the Americans, and at times special detachments were entirely incapacitated. Lord Cornwallis was

among those laid up by fever for a short period. The British were further handicapped by the presence of many American prisoners.

General Greene, again reinforced, engaged in several skirmishes with the British, the last of which occurred on April 7th, 1781. This fight ended the campaign in that area. Cornwallis then withdrew and marched northward toward Virginia.

After the arrival of French assistance, Washington planned to force a decision fight with the enemy, and the final battle of the war was fought. When Cornwallis surrendered at Yorktown, he reported 16% of his Army incapacitated by sickness.

General Washington hastened to remove his men from the Virginia malaria-infected locality and marched away toward home, leaving the sick behind in care of Dr. James Tilton. The French Army was sent to higher ground near Richmond, and they there remained until the following Spring.

Dr. Shippen inspected one of the French Virginia hospitals and reported their patients were very neat, clean and supplied with every necessity, even with night caps. He also commented, that French physicians were no more successful than the Americans in their treatment of wounds and sickness.

Colonel Duncan, in an appendix to his book on Medical Men of the Revolution, attempted to analyze the American War casualties. He reported sickness with resulting mortality, varied greatly from year to year during the seven years of the struggle. The largest number of deaths reported occurred in 1775 and 1776. The Army was comparatively healthy in the Northern Campaign of 1777, and very sickly when operating in the South, though some of this can be charged to neglect and indifference by the British in the protection of American prisoners.

Dr. James Thacher, who served in many hospitals and kept a Journal containing his observations, estimated the total casualities of the War as 70,000, or a yearly average of 10,000. This total would undoubtedly increase were it known how many of the soldiers sent home to recuperate, or die, really survived.

The United States War Department's tabulation indicates that 250,000 men were engaged in the War for Independence, but that no more than 40,000 were involved in any one year. These figures indicate a 25% annual average loss from sickness and wounds.

It has been stated that at the outbreak of the Revolution there were 3500 practicing physicians in the Colonies. An incomplete roster of medical men enrolled in the Continental Army included approximately 1400 names. These patriotic men were constantly exposed to the germs of death, and consequently to much greater danger than the fighting force.

Dr. James Tilton wrote that six of the physicians at Princeton were stricken down by putrid fever. It was also reported by Dr. Wm. Smith from Bethlehem that ten of his eleven hospital surgeons and three stewards, took the fever infection and several died.

Dr. James Tilton put it mildly when he wrote:

"My brethren of the Faculty will probably think it an important fact that more Surgeons died in the American service than Officers of the Line; a strong evidence that infection is more dangerous than the Weapons of War."

500 West Chelten Ave.
Philadelphia 44, Pa.

TRANSACTIONS & STUDIES

of the

College of Physicians of Philadelphia

Volume 17
(Fourth Series)

Number 4
(February 1950)

The Role of Medical Group Practice in the Changing Order*

By GEORGE BAEHR, M.D.

Director of Clinical Research, Mt. Sinai Hospital, New York

I AM deeply honored by your invitation to deliver the annual discourse before this old and renowned College in honor of one of your distinguished fellows, Dr. James M. Anders. It is especially gratifying to me to be asked to attempt a forecast of the changing pattern in the forms and methods of medical practice which may be anticipated in the coming years.

The Changing Order of Medical Practice

It is understandable that the vast majority of our profession are eminently conservative in regard to any change in the existing order, for they desire to conserve the present high standards of American medicine and hesitate to jeopardize them by new and untried schemes. But truly altruistic and successful conservatism is not identical with irrevocable perpetuation of the status quo, for we succeed in conserving the best elements in the existing order only if we continue to move forward and build upon the excellent foundation which our predecessors have created.

As a result of the preaching of our own profession, public education of the masses of our people is bringing to them an ever-widening appreciation of American medicine and what it has to offer in disease prevention and in the early recognition and treatment of illness at a stage when it can still be arrested. They are already seeking and will undoubtedly find the means for purchasing all the benefits of modern medicine for themselves and their families. The health and welfare funds of the United Mine Workers, amounting annually to $60,000,000, and of the United Automobile Workers, which will probably exceed $100,000,000 a year, are obvious examples of this urge, which is only beginning and will spread to all our people. We must, therefore, re-examine our present pattern of individualistic private practice remunerated by a fee for each medical service and determine whether it is capable of providing all the available benefits of preventive and curative medicine under the new order or whether some modification in methods of payment for medical care and in organization of our profession may not be necessary if our high standards are to be preserved and extended.

This nation is justifiably proud of its achievement in reducing morbidity and mortality,

* The James M. Anders Lecture XXIV, College of Physicians of Philadelphia, December 7, 1949.

especially in the early years of life, whereby the average life expectancy of an American has been extended almost twenty years in the last half century. Except for a few unsolved problems in the field of public health, such as reduction in the inexcusably high neonatal mortality rate, and the establishment of proper local health units where they do not as yet exist, the public health departments have probably achieved almost the maximum that they are capable of accomplishing with present public health methods. Their future program must largely be to consolidate and strengthen their present position so as to hold the gains. Now that few people die in the early years of life, the problem which will loom ever larger in the coming years will be concerned with the prevention and the prompt recognition of the earliest manifestations of the diseases of middle age. These preventive services must be provided largely by the medical profession, not by public health departments. Can the masses of the people with low incomes, the vast majority of the people of our country, obtain these benefits in adequate measure under our present system of medical practice?

National Compulsory Versus Voluntary Medical Care Insurance

As a result of recent controversy in the press and on the radio, the public and even many members of our own profession have been led to accept the fallacy that the issue is concerned solely with whether we should have national compulsory or voluntary forms of medical care insurance. This is not the whole story. Those of us who sincerely favor voluntary insurance because it offers an evolutionary rather than a revolutionary approach to the extension of medical care are obliged to admit that many of the evils of the national compulsory scheme as they relate to ultimate deterioration of medical standards are latent in equal measure in voluntary insurance programs if they are truly comprehensive in scope. To understand this statement it is only necessary to appreciate that when "solo" practitioners are paid a fee for each service by any insurance fund for comprehensive medical care, the demands of subscribers and, even more important, the financial rewards to the physician for unlimitable multiplication of services create a combination of influences most difficult, if not impossible, to control. The result of the inevitable multiplication of services is progressive pyramiding of costs, superficial performance because of excessive volume, and deterioration of the standards and ideals of medical practice. This was the carefully considered conclusion of the Committee on Medicine and the Changing Order of the New York Academy of Medicine after an exhaustive four-year study of the experiences of foreign compulsory plans and of voluntary medical insurance plans in this country. It has been the experience of the California Physicians Plan and the Michigan Plan. Because of abuses these plans were obliged soon after their establishment to reduce their scope for the most part to medical expense indemnity for those illnesses which were sufficiently advanced to require hospitalization. By excluding 90 per cent of all medical services required by people for the prevention and for the early recognition and treatment of disease, these and similar Blue Shield plans lost their essential social significance, though they may be widely sold because they are inexpensive.

The limited coverage now characteristic of almost all Blue Shield and commercial insurance plans is a candid acknowledgement that "solo" medical practice on a fee-for-service basis is incompatible with comprehensive medical care insurance, unless its incalculable deficits are met out of the tax resources of government, as in the compulsory program of New Zealand.

If we are to extend voluntary medical insurance plans in this country which will provide complete medical care, preventive and curative, the New York Academy of Medicine believes that they must at first be experimental and be organized at least in part on a new basis designed to meet the varying local needs of different urban and rural areas. We must first determine by practical demonstrations how medical services can be organized and remu-

nerated to enable the medical profession to provide comprehensive care of high quality under a prepayment system. If they are to be developed promptly and widely, such voluntary programs will require some assistance from government*, similar to that provided for voluntary and municipal or county hospitals under the present Hospital Survey and Construction Act. Above all, members of our own profession need education through experience with such demonstrations before they will lose their traditional timidity and appreciate the advantages to them and to the public of newer methods of organized medical practice which are better attuned to the times.

Varieties of Medical Group Practice

The experience already available in this country has demonstrated the ability of physicians to render comprehensive medical services under voluntary prepayment plans when they are organized for medical group practice and are remunerated on a per capita basis. No one can dispute the advantages of group medicine as practiced on the wards of our best hospitals. Private group practice of high quality on a fee-for-service basis is exemplified, of course, by the Mayo, the Lahey, and the Chicago University Clinics. There are hundreds of similar medical groups of this "referral" type which limit their care to patients with serious illness referred by private physicians. There are also several hundred private medical groups throughout the country which provide comprehensive medical care to families, including services in their homes on a fee-for-service basis. Almost all have been established as medical partnerships and include general physicians and specialists. To mention only a few, there is the excellent Hitchcock Clinic at Hanover, New Hampshire, the Summit Medical Group in New Jersey, the Mary Imogene Bassett Hospital in Cooperstown, New York, the Duluth Clinic and the Nicollet Clinic in Minnesota, the Dallas Medical and Surgical Clinic in Texas, and the Palo Alto Clinic in California. There are hundreds of others, some of which, in addition to providing comprehensive medical care to their own clients, also serve the patients of unattached physicians of a wider geographic area as a "referral" clinic. Under a prepayment plan it would be a simple matter for these medical groups to care for subscribers who prefer to be served by a group rather than by individual physicians.

Among successful medical groups which provide comprehensive care to insured persons in return for annual per capita payments, the best known are the Ross-Loos Clinic in Los Angeles, Trinity Hospital in Little Rock, Arkansas, the Group Health Association in Washington, D. C., New York, and St. Paul, the present Permanente Clinic serving the San Francisco Bay area, and the Elk City Farmers Cooperative Hospital. Still other group practice units have been established to give complete medical care to the workers in a single industry or industrial plant, as at the Endicott-Johnson Shoe Company of Binghamton, New York, whose medical service has been in successful operation for almost forty years, the Tennessee Coal, Iron and Railroad Company in Alabama, the Stanacola Employees Medical and Surgical Association of Baton Rouge, Louisiana, and the Permanente Group which served the employees of the Kaiser Shipyards on the West Coast during the war.

Deterrents to Group Practice under Prepayment Plans

Under the rules of most of our medical societies there have heretofore been two major deterrents to the establishment of medical groups under voluntary prepayment plans: the requirement of a fee for each service and the requirement of so-called free choice. The fee-for-service method of remuneration, whether under voluntary medical society auspices or under a compulsory governmental plan, as in New Zealand, is expensive, difficult to administer and serves to perpetuate unorganized individualistic practice. The more important deterrent to the establishment of group prac-

* Assistance by government could also take the form of payment for the care of its own employees and for public assistance cases.

tice under voluntary insurance plans has been the interpretation by medical societies of the term "free choice of physician." To them the term implies that every licensed physician in the state must be eligible to render medical service under any voluntary plan if it is to secure the approval of the state medical society. On the other hand, to the consumers of medical care "free choice" includes freedom to prefer medical services by a group of physicians if they believe that that form of organized medical care will serve them better and thereby to forego the privilege of selecting individual physicians in an unorganized aggregate.

In order to maintain high standards and compete on a merit basis with other groups and with unattached physicians, medical groups require the same right to select their staff of general physicians and specialists that hospitals enjoy. Medical groups also find it advantageous to accept per capita payment for the care of insured persons because it enables them to plan their physical facilities and staff organization to meet the load of anticipated services. In some states prohibitive laws have been enacted to prevent or discourage the organization and operation of medical groups under a voluntary prepayment plan. The action of the House of Delegates of the American Medical Association at its recent meeting in Atlantic City was a forward step which may influence the state medical societies to liberalize their attitude toward medical groups and voluntary prepayment plans not controlled and operated under medical society auspices.

The Health Insurance Plan of Greater New York

Despite these deterrents, a significant experiment in group practice under a voluntary prepayment plan was launched in New York in March 1947. I shall describe this plan in some detail, not only because I am familiar with it but because it has proved to be a valuable source of practical experience. The Health Insurance Plan of Greater New York, with which I am associated as Chairman of the Board of Directors, is a community-sponsored, voluntary medical care plan incorporated under the State Insurance Law as a non-profit agency. Its Board of Directors now includes the Mayor and high officials of the municipal government, the heads of two of our largest banks, important leaders of private industry, representatives of the CIO and AF of L, and eight physicians selected for their exceptional professional or administrative experience, two of whom are the administrative heads of medical schools (Columbia and Long Island College). The determination of professional eligibility of participating medical groups and of standards for their physical facilities and services is the responsibility of a Medical Control Board comprised of several medical members of the Board of Directors and representatives of the participating medical groups, the New York Academy of Medicine, and two of the county medical societies. Matters which concern the relationship of participating physicians to the Health Insurance Plan and its subscribers are cleared through a Joint Conference Committee consisting of four physicians who represent the participating groups, one from each major borough of the City, and four members of the Board of Directors, two of whom are physicians. The medical division of HIP is assisted by a division maintaining liaison with the subscribers to facilitate the work of the medical groups and a research section which studies the utilization of services.

In order to enable lower-paid workers to subscribe to the plan, HIP requires the employer to pay half the premium. Unless the employer paid at least half, the lowest-paid workers could not afford to pay the annual premium required to provide comprehensive care of high quality for them and their families. A voluntary insurance plan also requires an incentive other than thrift. The employer contribution encourages employees, especially those of low income, to join because of the financial as well as health incentive.

Enrollment in HIP is open to groups of twenty-five or more persons having a common employer if at least 75 per cent join; also to

employed groups of ten to twenty-five if 90 per cent agree to join and include their dependents. Most subscribers to HIP have been enrolled in family units. Workers earning up to $5,000 a year and families with a total income which does not exceed $6,500 pay the base premium rate. After January 1, workers in enrolled groups of employees whose wages are above $5,000 will also be permitted to join on payment of a premium 50 per cent above the basic rate. It is estimated that they do not constitute more than 5 per cent of enrollable employee groups.

Beginning January 1, the basic premium rate for a subscriber without dependents will be about $17.00 a year and an equal sum is contributed by the employer, making a total of about $34.00 a year. Couples pay double and families of any size pay three times the single rate, the employer in each instance contributing an equal amount. An unmarried worker's payroll deduction for complete medical care, therefore, amounts to 33 cents a week; couples pay 66 cents a week; and families pay three times the individual rate, or about $1.00 a week, regardless of the size of the family. A family of fourteen pays the same premium as a family of three, which of course reduces the average return per enrollee to the Plan. On the other hand, payment to the medical groups is not affected by the family size, for they are remunerated on a per capita basis. After January 1, they will receive $23.04 for each enrollee in the low-income group and $34.56 a year for those earning above $5,000.

The New York State legislature enacted a law authorizing the City administration to pay half the premiums for its employees who desire to enroll and for all dependent members of their families. In addition to employees of the City of New York and their families, the 227,000 insured persons served at this moment by HIP include the employees of United Nations and of many business and industrial firms, labor unions, and social welfare agencies.

Now in its third year of operation, HIP is providing comprehensive medical care to its 227,000 enrollees in their homes, at physicians' offices, at medical centers, and in hospitals. This service is provided through twenty-six medical groups situated in various parts of New York City, comprising 696 physicians, of whom 271 are general practitioners and 425 are internists, pediatricians, and other specialists. In all groups, the chief of each of the twelve basic specialties must hold a certificate from an American Specialty Board or an appointment as attending or associate attending on the staff of a hospital approved by the AMA for resident training in his specialty, or he must have equivalent qualifications. Because of its rapid growth and in order not to keep it a closed corporation of doctors, two additional medical groups will be added to HIP on January 1 and two on March 1, 1950, so that by that date the subscribers will be served by about 800 physicians organized into thirty medical groups.

The subscribers are entitled to general medical care, specialist and surgical care, preventive services, maternity and pediatric care, diagnostic laboratory procedures, x-ray examinations and x-ray therapy, radium and radon treatment, physical therapy, administration of blood and plasma, and psychiatric advice but not prolonged treatment. They are also entitled to visiting nurse services in the home and to ambulance transportation. No additional charge is made for any service except for night calls between 10 p.m. and 7 a.m., for which a fee of $2.00 may be collected by the medical group. Many of the groups ignore this unless there is abuse. All types of illness and disability are covered, including pre-existing conditions. There are no physical examinations for admission and no age limits or waiting periods. The cost of hospitalization is covered by a separate Blue Cross or commercial hospital insurance contract, which all subscribers must carry.

Not included are treatment for drug addiction, acute alcoholism, or chronic conditions such as mental disease and tuberculosis which require care in an institution other than a general hospital. Drugs, dentistry, prosthetic appliances, eyeglasses, and purely cosmetic sur-

gery are not covered. For exceptional procedures such as brain surgery, fenestration surgery, and operation for congenital heart disease, the groups reinsure themselves through HIP, which contracts with some of the best surgeons in the City for the care of these patients and thereby relieves the groups of this unusual and unpredictable responsibility and expense. The cost of radium and radon is also paid from this fund.

When a subscriber enrolls, he selects one of the several medical groups serving the county or area in which he lives. He then selects one of the general physicians in the medical group as his personal or family physician, who in turn arranges for all necessary specialist or laboratory services.

The medical groups are individually organized as partnerships and are completely autonomous, except that they must possess the physical facilities and meet the organizational pattern and professional requirements of the Plan's Medical Board. Three medical groups are already serving more than 20,000 subscribers each and one about 26,000.

Under the new capitation rates, HIP will pay its medical groups during the first quarter of 1950 at a rate of over $5,000,000 a year for the care of 227,000 persons. This represents 80 per cent of premium income, which compares most favorably with Blue Shield plans. Although still in its early promotional stage of development, costs of central administration are already down to less than 12 per cent; an additional 4 per cent of gross premium income is set aside for the legal reserve required by the State Insurance Department, and a similar amount is being withheld temporarily to cover indemnity for illness and accidents away from home, for other possible contingencies, and for repayment of some generous loans which were made by philanthropic foundations to assist HIP in establishing the program.

Under the new capitation rate, a medical group on reaching its objective of 20,000 subscribers, has a gross income of at least $460,000 a year. The groups, in accordance with their partnership arrangements, remunerate their members on an annual salary basis, after defraying their operational costs. The average net income of a full-time physician after deduction of all operating costs of the groups is at least $10,000 a year. If upper-income subscribers enroll in the future at a higher premium rate, the average net income is expected to rise to about $12,250, should the upper-income families join in the same proportion as they now exist in the currently enrolled employee groups. Since younger physicians of the medical group receive less and senior members substantially more, it is believed that this is reasonably adequate compensation for medical services rendered to persons of low income, many of whom formerly received free care at clinics and hospitals or were treated by physicians at reduced fees or as charity cases. It should also be emphasized that in addition to their income from HIP, all medical groups and the physicians affiliated with them derive additional income from private practice on non-insured patients and from services rendered in veterans' and workmen's compensation cases. Only one medical group, the Montefiore Hospital Unit in the Bronx, is manned almost entirely by full-time physicians and specialists who do not engage in private practice. The New York University Group is in the process of reorganization on this basis. In all other medical groups, most of the participating physicians are on part time and still engage in a variable amount of private practice.

Each group operates through a central administrative office and laboratory with a variable amount of office space for members of its staff. In eight, both clinical and laboratory services are located in a complete health center, although many of the general physicians and some of the specialists in most of these groups (all but the New York University and Montefiore units) continue to see patients in their private offices, which are located nearer the homes of their enrolled subscribers. In others, the requirement of a complete health center to house the offices of the entire staff

was waived temporarily because of low enrollment in the early days and the postwar shortages and costs of building materials, but these groups will be required to meet the terms of their contract within the next year or as soon as their subscriber enrollment reaches 10,000.

From the previous experiences of older groups in other parts of the country, it was estimated that twelve and a half full-time physicians or an equivalent proportion of physicians on part time would be able to provide the medical services required per 10,000 people, a ratio of one full time physician for each 800 subscribers. This number has seemed to be adequate for most of the HIP groups but not for all. The director of one of the best groups finds that fifteen full-time physicians for each 10,000 subscribers are required if comprehensive preventive services are to be provided for all enrollees. Differences in the age-sex composition of a given group's enrollment, as well as the extra work necessary shortly after a new enrollment, are important factors in determining the required number of physicians, as is also the judicious use of auxiliary personnel—visiting nurses, optometrists, etc.

It is already obvious that the calibre of work of the various groups is not uniform. A special survey of the staff operations and clinical services of the twenty-six groups has revealed striking differences between them based only in part upon the existence or absence of a complete health center. Some groups, including those at teaching hospitals, maintain the highest standards of service, and there are all gradations among the others. The groups are comprised of physicians and specialists who represent a good cross-section of the reputable members of the medical profession of the City. However, a plan such as HIP must be able to take an average sample of the physicians and specialists in the community and, by welding them together into a cooperative group and gradually indoctrinating them with the ideals of modern preventive and curative medicine, enable them to do better work than they could ever accomplish as uncontrolled and unsupervised physicians, practicing medicine in isolation.

The survey in progress has disclosed deficiencies in the various groups which would have gone undetected in ordinary private practice. Without any pressure from HIP, their revelation to each group by the physician making the survey usually results in their correction. The most effective means at the disposal of HIP for elevating the standards of medical practice by all groups is to use the experience of the best groups, for example in cancer detection or volume of ophthalmological or other specialty services, as yardsticks for measuring the performance of the others.

Fears that the availability of unlimited medical services would be abused by subscribers have proved to be unfounded. In fact, continued education of subscribers is required in some instances to encourage more adequate utilization. Approximately 500,000 physician services (exclusive of those of radiologists and pathologists), from a home or office visit to a major operation, have been required per 100,000 subscribers per year. This is less than was anticipated. Of these, about 57 per cent have been rendered by general physicians and 43 per cent by specialists. The combined services of the general physicians, internists, and pediatricians accounted for about 70 per cent of all services. Several medical groups, among them the one with the largest enrollment (Central Medical of Brooklyn), require all children to be cared for by pediatricians from the time of birth to twelve years of age and relieve the general physician of this responsibility. Ninety-eight per cent of all obstetrical services are rendered by obstetricians. About 12 per cent of all services are home calls. Seventy-nine per cent of the medical services are rendered in the health centers or in doctors' offices. One of the most impressive experiences has been that only 8.9 per cent of the total services have been rendered in hospitals,* despite the

* The statistics in this paragraph include every pre- and post-operative visit to a patient as well as the operative service itself, but not radiologists' or pathologists' services at either the group center or the hospital.

fact that all hospital bills and also some of the laboratory services for hospitalized patients are payable by Blue Cross and not by HIP. The fact that 91 per cent of all medical services, preventive, diagnostic, and curative, are rendered outside of hospitals is a demonstration of the inadequacy of limited insurance coverage restricted solely to hospitalizable illness. It is an unanswerable argument in favor of coverage for comprehensive medical care.

The Role of the General Physician

The declining status of the general practitioners in modern society has been much deplored in recent years, but no one has heretofore done anything about it except preach. Under group practice in HIP, the general physician is an equal partner and his relative financial rewards approach those of the specialists. His contacts with his patients are as intimate as those of any solo practitioner and are, in fact, far less restricted because of the absence of a monetary barrier for each service. At his call he has the resources of the group with all its physical facilities and expert skills, ready to be drawn upon without the limitations which would, in ordinary private practice, be imposed by the patient's economic circumstances. Daily association with the senior members of the group and the hospitals with which they are identified provides a continuing educational experience. This is especially evident when the general practitioner sees his patients at the health center. The young physicians who join a medical group need not "cool their heels" waiting for patients during the best years of their lives as do those who hang out a shingle and try to establish themselves in solo practice. Their time is fully occupied from the first day of their career with fruitful and edifying professional work.

Like specialists, the general physicians of the group have regular opportunities for adequate vacations without that constant fear of financial sacrifice and loss of practice which haunts most individual practitioners. Most evenings, Sundays, and holidays can be undisturbed, for they can alternate with associates. Equally important, they can, from time to time, afford to take sabbatical periods for special training in some chosen field so that they may become more valuable members of the group. In future years, when the groups have grown large enough to have accumulated a sufficient reserve, it is hoped that they may be able to provide disability and retirement benefits for their members.

For the general physicians it all adds up to greater professional satisfaction as well as economic security. It is my considered opinion that only by the association of general practitioners with specialists as equal partners in group practice can, in this modern world, the ancient dignity and importance of the general physician be restored and enhanced.

Preventive Medicine in Modern Practice

Preaching to the medical profession by medical schools and medical societies over the years concerning periodic health examinations and preventive medicine has been largely futile. By its very nature solo medical practice is at present incapable of providing comprehensive preventive care because it sells its services on a piece-work basis and chiefly on demand. No such barrier exists between the general physicians of a medical group remunerated on a per capita basis and the families entrusted to their care. The utilization of the official health department's services and the preventive services rendered by its HIP physicians in the homes and places of work of subscribers is of paramount importance to the medical group, for the costly burdens of preventable illness and accidents drain the financial resources of the group. This fundamental fact was discovered independently by many of the HIP groups. In line with their present emphasis on preventive care, twenty of the HIP groups distribute informational bulletins to their subscribers periodically. These contain preventive information appropriate to the season and also advice on how to obtain the maximum benefit from the service. Through this means, more

adequate utilization of the groups' facilities for disease prevention and early diagnosis is being stimulated. Some groups are planning educational lectures for their enrolled subscribers.

In several of the groups with complete health centers we hope shortly to establish a family counseling service on an experimental basis with funds derived at first from private sources. There has been much discussion in recent times concerning preventive psychiatry, but no agreement on how and where to apply such services effectively. A family counseling facility as part of a comprehensive health and medical service may prove to be the logical point of attack upon this overwhelming problem of present-day society.

Group Practice at Teaching Hospitals

The University of Chicago Clinics have long demonstrated: 1) that group practice can be carried on among private patients by a teaching hospital; 2) that this private clinical material can be utilized for undergraduate and postgraduate teaching and research; and 3) that group practice can provide part of the compensation of full-time members of the staff of a teaching and research hospital. Two of the HIP groups are at teaching institutions, one at New York University Medical School and the other at Montefiore Hospital, a teaching unit of Columbia University. The establishment of group practice units is at present under consideration at teaching hospitals of Harvard, Cornell, Johns Hopkins, and other medical schools.

Unless some steps are taken in advance to safeguard medical education, medical care insurance can have seriously adverse effects upon medical teaching. As prepayment plans for medical care are extended throughout this country to an ever larger segment of the population through medical care insurance, increasing numbers of industrial and farm workers enrolled in such plans will forsake the free wards and out-patient clinics for private, low-cost care. It can therefore be predicted that many medical schools will be obliged to reorganize part of their clinical staff for group practice in order to preserve this clinical material for teaching and research.

Aside from other advantages, the additional income from this source will enable a medical school or teaching hospital to retain a much larger part of its staff on a "geographic full-time" basis, without interfering seriously with their teaching and research responsibilities. With the aid of income from the group practice unit, exceptional young physicians can be retained in the educational and scientific environment of the teaching hospital for some years, until they reach their full professional development. By extending its group services into the homes of people, teaching hospitals are in a position to add many of the general practitioners in the community to their staff as partners in the group enterprise.

Medical groups sponsored by teaching hospitals are for the first time in a position to train their undergraduates and residents in the actual everyday practice of medicine, which is at this moment the most neglected area of medical education. In most praiseworthy fashion many of our medical schools endeavor to reach the pinnacle of scientific achievement and cram the young student and resident with the fruits of medical science. But this should not deter some members of the medical faculty from organizing and using a medical group for the purpose of teaching these young men how to apply their budding knowledge to the treatment of families, with full appreciation of those psychological and environmental handicaps which play so determining a role in illness. For those young physicians who intend to engage in group practice in other urban or rural localities, a special residency in the practice of medicine can be established in the group practice unit where experience may be acquired concerning the administrative problems of this form of modern medical practice, as well as the functioning of the group in the preventive as well as the curative aspects of comprehensive medical care.

If the privately endowed and supported medical schools and teaching hospitals are to survive in this changing world, they must be realistic and assume their rightful responsibility to the communities which they serve and from which they expect support. Rather than lag in the wake, they should point the way to newer and better forms of medical practice and actually provide the yardsticks with which to measure the performance of the rest of the medical profession, for whose training they were responsible.

Let me state in conclusion that I have no illusion that medical service can be rendered exclusively by medical groups under any prepayment plan, voluntary or governmental. Some segment of medical care will always continue to be rendered by individual physicians. The time has arrived when intelligent and progressive leaders in medicine should take the initiative and cooperate with one another in evolving local patterns of comprehensive medical care which will serve local needs for the whole panorama of preventive as well as curative medicine under prepayment plans, which are spreading and which will inevitably affect all of us and our institutions.

Transactions of the Sections

SECTION ON GENERAL MEDICINE

24 October 1949

Comparison of Oral Penicillins[1]. William P. Boger*, M.D., John O. Beatty*, M.D., and Harrison F. Flippin, M.D. (Discusser: Amedeo Bondi, Jr.*, PH.D.)

Factors Influencing Retention of Bromsulphalein in the Blood of Patients with Viral Hepatitis. W. Paul Havens, Jr., M.D., Wade N. Miller*, M.D., William E. Swift, Jr.*, M.D., Horace T. Gardner, M.D., and Marjorie Knowlton*, B.S. (Discusser: John R. Neefe, M.D.) (*Abstract 1, below.*)

Hypercoagulability of Blood after the Ingestion of Fat. Jerome M. Waldron*, M.D., and Garfield G. Duncan, M.D., (Discusser: Thomas Fitz-Hugh, Jr., M.D.) (*Abstract 2, below.*)

The Straining Procedure as an Aid in the Anatomic Localization of Murmurs and Other Sounds of Cardiovascular Origin. Calvin F. Kay, M.D., and Harry F. Zinsser, Jr.*, M.D. (Discusser: Morris W. Stroud, III*, M.D.) (*Abstract 3, below.*)

28 November 1949

The Effectiveness of Neomycin against Pathogenic Organisms Resistant to Other Antibiotic Agents. Garfield G. Duncan, M.D., Carl F. Clancy*, PH.D., and J. Manning Hudson*, M.D., *Discussion*: Chemotherapeutic Potentialities of Neomycin. Selman A. Waksman*, PH.D. (*Abstract 4, below.*)

Chronic Pyelonephritis Simulating Addison's Disease. A. J. Creskoff, M.D., Edward Rose, M.D., and Thomas Fitz-Hugh, Jr., M.D. (Discusser: Charles L. Brown, M.D.) (*Abstract 5, below.*)

Vanishing Tumor of the Lung—a Manifestation of Congestive Heart Failure. William I. Gefter*, M.D., and Katharine R. Boucot*, M.D. (Discusser: Francis C. Wood, M.D.) (*Abstract 6, below.*)

A Study of Intermittent Claudication. Meyer Naide, M.D. (Discusser: Joseph A. Wagner, M.D.) (*Abstract 7, below.*)

SECTION ON MEDICAL HISTORY

Second Series of Lectures for Medical Students

Primitive Medicine. M. F. Ashley Montagu*, PH.D. (*10 October 1949.*)

Greek and Roman Medicine. Hirsh W. Stalberg*, LL.B. (*17 October 1949.*)

Medieval Medicine. Owsei Temkin*, M.D. (*24 October 1949.*)

Renaissance Medicine. M. F. Ashley Montagu*, PH.D. (*31 October 1949.*)

Seventeenth Century Medicine. Owsei Temkin*, M.D. (*7 November 1949.*)

Eighteenth Century Medicine. Louis B. Laplace, M.D. (*14 November 1949.*)

Nineteenth Century Medicine. Richard H. Shryock*, PH.D. (*21 November 1949.*)

Twentieth Century Medicine. Maurice S. Jacobs, M.D. (*28 November 1949.*)

American Medicine. William G. Leaman, Jr., M.D. (*5 December 1949.*)

Social Medicine. Iago Galdston*, M.D. (*12 December 1949.*)

SECTION ON OPHTHALMOLOGY[2]

20 October 1949

Meningioma of Tuberculum Sella. Benjamin M. Chambers*, M.D. (Discusser: Robert A. Groff, M.D.)

Fibrin Closure of Surgical Wounds. Arno E. Town, M.D. (Discusser: Carroll R. Mullen, M.D.)

* *By invitation.*

[1] Printed in *Transactions & Studies of the College of Physicians of Philadelphia* 17: 105, December, 1949.

[2] The presentations at this Section are customarily abstracted in the *American Journal of Ophthalmology* and the *Archives of Ophthalmology.*

The Influence of Drugs on the Restoration of the Intraocular Pressure in Normal Eyes following Paracentesis. Irving H. Leopold, M.D., and Robert Day*, M.D.

17 November 1949

The Macula in the Aged. Arthur J. Bedell*, M.D. (*Twelfth Annual de Schweinitz Lecture.*)

15 December 1949

Thyrotropic Exophthalmos and Pseudotumor: Case Presentation. Edmund B. Spaeth, M.D., and Howard Bedrossian*, M.D. (Discusser: Robert A. Groff, M.D.)

Observations on Retrolental Fibroplasia. William O. LaMotte, Jr., M.D., and George S. Tynor*, M.D.

Reduction in Visual Acuity Due to Sunlight. Robert Peckham*, M.D. (Discusser: Robert Harley*, M.D.)

SECTION ON OTOLARYNGOLOGY[3]

16 November 1949

Therapeutic Procedures for Disorders of the Voice. Georgiana M. Peacher*, Ph.D. (Discusser: Louis H. Clerf, M.D.)

[3] The presentations at this Section are customarily abstracted in the *Archives of Otolaryngology.*

Dermoid Cysts of the Neck. C. F. Grabske, Jr.*, M.D.

The Problem of Treatment of Cancer of the Paranasal Sinuses. John V. Blady, M.D. (Discusser: Karl M. Houser, M.D.)

14 December 1949

The Eustachian Tube. Stacy R. Guild*, Ph.D.

SECTION ON PUBLIC HEALTH, PREVENTIVE AND INDUSTRIAL MEDICINE

12 December 1949[4]

Panel Discussion. Public Health Nursing: Generalized vs. Specialized Nursing. Roscoe P. Kandle*, M.D., *moderator;* Marian Shands*, Mildred Hall*, Ruth Hubbard*, Russell Teague*, M.D., Hubley R. Owen, M.D.

[4] Joint meeting with the Philadelphia Public Health Society, and Public Health Nurses, District No. 1.

Abstracts

Abstract 1

Factors Influencing Retention of Bromsulphalein in the Blood of Patients with Viral Hepatitis. W. Paul Havens, Jr., M.D., Wade N. Miller, M.D., William E. Swift, Jr., M.D., Horace T. Gardner, M.D., and Marjorie Knowlton, B.S.

The effect of ingestion of food on the removal of bromsulphalein from the blood was investigated in 92 patients with viral hepatitis and 26 normal persons. The patients with hepatitis and, to a lesser degree the normal persons, had an increased capacity to clear the dye from the blood when the test was performed 60 to 90 minutes postcibum as compared with results obtained in testing the same subjects in the fasting state.

The relationship between different amounts of bilirubin in the serum (1′ direct and total) and the percentage of retention of intravenously injected bromsulphalein was studied in 986 patients with viral hepatitis. Although there was no constant quantitative relationship between the percentage of retention of dye and the amounts of 1′ direct and total bilirubin, there was a degree of correlation sufficient to make it possible to predict the likelihood of a normal amount of retention of dye at various levels of bilirubin. 61.7% of serums in which the 1′ direct bilirubin measured 0.2 mg.

or less had normal retention of bromsulphalein, while only one out of three serums with 1′ direct bilirubin measuring from 0.51 to 1.0 mg. had a normal percentage of retention of dye. The dissociation in the capacities of patients with hepatitis to remove bromsulphalein and bilirubin from the blood varied somewhat with the phase of disease. In general, within a given range of serum bilirubin the percentage of serums with abnormal retention of dye was higher in the acute phase of disease, tending to decrease during convalescence until the end of the third month.

Abstract 2

Hypercoagulability of Blood After the Ingestion of Fat. Jerome M. Waldron, M.D., and Garfield G. Duncan, M.D.

Experiments are presented on dogs which show that the ingestion of fat in the form of olive oil, corn oil or heavy table cream increases the coagulability of the blood. This hypercoagulability is detectable within one-half hour after the ingestion of fat and progressively increases until a very low coagulation time, in collodion-lined glass tubes, is obtained. The reduced coagulation time persists as long as the turbidity of the alimentary lipemia is present.

Hospitalized patients with various diseases were studied after the oral ingestion of two ounces of cream. These patients exhibited the same hypercoagulability of the blood as the experimental animal. Maintenance of the patient on a high fat diet, as in ulcer therapy, does not make the patient refractory to the effect of ingested fat nor does the customary feeding of cream every two hours change the response except to augment it.

These findings suggest that this increase in coagulability of the blood, due to ingested fat, is an important factor, previously not considered in the treatment of gastrointestinal bleeding in general and in bleeding peptic ulcer in particular. Furthermore, it suggests that diet may have an important bearing on thrombotic phenomenon.

Abstract 3

The Straining Procedure as an Aid in the Anatomic Localization of Murmurs and Other Sounds of Cardiovascular Origin. Calvin F. Kay, M.D., and Harry F. Zinsser, Jr., M.D.

1. Patients with heart murmurs associated with a wide variety of cardiovascular lesions were subjected to a standardized straining procedure. Heart sounds, border movements of the great vessels, intrapulmonic pressures, and electrocardiograms were recorded.

2. Murmurs were reduced in intensity during straining. The response after relaxation depended upon the anatomic location of the lesion. (a) Murmurs derived from the pulmonic circulation returned immediately. Murmurs derived from the left heart and systemic circulation returned only after an appreciable delay. (c) The presystolic component of the murmur of mitral stenosis and the murmur of patent ductus arteriosus each showed a characteristic modification of the left-sided response. (d) Murmurs associated with complex intracardiac shunts responded variably.

3. These changes in murmur intensity were correlated with the sequence of dynamic events during and after an increase in intrathoracic pressure.

4. Sounds other than murmurs were also affected, and a brief discussion of these is included.

5. Observations of the effect of straining upon murmurs and sounds should be useful in teaching and in the investigation of the nature and origin of obscure heart sounds and murmurs.

Abstract 4

The Effectiveness of Neomycin against Pathogenic Organisms Resistant to Other Antibiotic Agents. Garfield G. Duncan, M.D., Carl F. Clancy, PH.D., and J. Manning Hudson, M.D. *Discussion:* Chemotherapeutic Potentialities of Neomycin. Selman A. Waksman, PH.D.

Although chemotherapeutic agents in current

use have reduced greatly the clinical hazards of most bacterial infections, there still occur infections with organisms resistant to the available antibiotics, as well as others in which the bacterium develops a resistance to the drug during therapy.

Waksman[1] emphasized that a new antimicrobial agent must be: unfavorable to the development of resistance by bacteria, non-toxic, and potent, either alone or in combination with other agents, against pathogenic bacteria. Neomycin[2] has met these requirements and has been used successfully in treating two patients infected with organisms resistant to penicillin, streptomycin, aureomycin, and chloromycetin.

Neomycin is produced by *Streptomyces fradiae*, a soil actinomyces. It was discovered by Waksman and Lechevalier[2] in their search for an antibiotic agent effective against streptomycin resistant strains of *M. tuberculosis*. Physico-chemical studies indicate neomycin to be a basic compound, soluble in water, relatively thermostable and is active against many gram negative and gram positive bacteria. *In vitro* activity against the *M. tuberculosis*, even streptomycin resistant strains was demonstrated.

Recently in our own laboratory 15 isolations, including *A. aerogenes*, *Ps. aeruginosa*, *Proteus*, *E. Coli*, and hemolytic *Staph. aureus* have been found to be sensitive to neomycin but resistant to other antibiotics.

Case 1. R. P., a 47-year-old male, was admitted to the Benjamin Franklin Clinic of the Pennsylvania Hospital complaining of pain in flanks and groin, chills and fever. A history of symptoms referable to his urinary tract was evident for the past $3\frac{1}{2}$ years, which became more acute during the preceding 6 months. Treatment with courses of penicillin, streptomycin, aureomycin, chloromycetin, and urinary antiseptics has in some instances produced an initial improvement, but complete relief was never attained.

Physical examination indicated the patient to be acutely ill, moderately obese; hepatomegaly and acute tenderness of the left renal area were noted. An abundant growth of *A. aerogenes* was cultured from the urine. X-ray studies showed an enlarged left kidney with an irregular outline; both ureters were large and atonic as frequently seen in longstanding infections of the urinary tract.

On the 6th hospital day the patient's fever rose to 105° F. and a blood culture revealed the presence of *A. aerogenes*. During the subsequent days the acute illness subsided but clinical signs and symptoms indicated persistence of the infection.

A transplant of the isolated *A. aerogenes* was found to be very sensitive to neomycin and through the courtesy of Dr. Waksman enough drug was supplied to treat the patient for 5 days. Intramuscular injections of neomycin were given every 4 hours for 5 days (9.9 gm. total dosage) with no apparent toxic effects. Urine cultures became sterile within less than 12 hours after onset of therapy and have remained so for 6 weeks following therapy. Neomycin assays of the urine have shown a concentration of 15–30 units/ml.

Case 2. The second patient to receive neomycin was aged 64. He was critically ill on admission—having a profound acidosis—CO_2 combining power 4.5 M. eq. (10 vol. per cent) and a blood urea nitrogen of 240 mg. per 100 ml. secondary to prostatism. Following gradual decompression of his bladder the blood urea nitrogen decreased to 35 mg. per 100 ml. and the acidosis subsided, but a urinary tract infection with *A. aerogenes* persisted. A scant growth of *B. pyocyaneus* (*Ps. aeruginosa*), and later a fungus believed to be Geotricum, were recovered from the urine. The aerogenes and pyocyaneus organisms were very sensitive and the Geotricum was moderately sensitive to neomycin. Each was resistant to the other antibiotic agents.

As in Case 1, the urine was sterile within 12

[1] Waksman, S. A., Hutchison, D., and Katz, E.: Neomycin Activity Upon Mycobacterium Tuberculosis and other Mycobacteria. Amer. Rev. Tuberculosis, 60: 78 (No. 1), July, 1949.

[2] Waksman, S. A., and Lechevalier, H. A.: Neomycin, A New Antibiotic Active against Streptomycin-Resistant Bacteria, including Tuberculosis Organisms. Science, 109: 305, 1949.

hours after the onset of neomycin therapy but on the second and third days of treatment only 6 sterile specimens were obtained, 6 others being grossly contaminated with pyocyaneus and the fungus. On the morning of the 4th day the urine was sterile and remained so for the duration of 3 days of therapy. A specimen on the following day was sterile but as a retention catheter was still in place it was not surprising that the urine became contaminated several days later.

Summary. Two cases of urinary tract infections successfully treated with neomycin are reported. No toxic effects were noted in the patients during the short courses of therapy. From these observations it would appear that there is a definite field for clinical usefulness of neomycin.

Discussion

CHEMOTHERAPEUTIC POTENTIALITIES OF NEOMYCIN

Neomycin is an antibiotic active against a large number of bacteria, both of the gram-negative and of the gram-positive types, including acid-fast bacteria. It has no effect upon fungi or viruses.

Only small amounts of neomycin are required to protect experimental animals against infection by various bacteria. In using mice weighing about 20 gm., it was found that 3 to 12 units of neomycin were sufficient for protection against *Staphylococcus aureus*, 50 to 75 units against *Salmonella schottmulleri* and 100 units against *Eberthela typhosa*. This included both streptomycin-sensitive and resistant strains. Since the LDO for the neomycin preparations used in these experiments was at least 2,000 units per mouse the ratio between activity in experimental animals and toxicity was very wide indeed.

When the production of neomycin was undertaken by certain industrial organizations using different media and different methods of isolation, it was found that the toxicity of the neomycin preparations thus obtained were somewhat greater than the small lots produced in our laboratory. This suggested the need for a careful comparison of such preparations. Twelve lots were obtained from different manufacturers. They showed the following distribution of toxicity to mice, when given a single subcutaneous injection and recorded 10 days after injection: 5 lots gave LDO greater than 1,500; 1 lot gave a LDO at 1,500 and LDO greater than 750 units; 6 lots gave a LDO between 750 and 1,500 units per mouse. On comparing this range of toxicity with the range of *in vivo* activity recorded above, the ratio is still wide enough to justify the practical use of neomycin. The six more toxic lots had an LDO of 750 units per mouse. This is at least 8 times as high a figure as that which was required to protect even the most resistant bacteria in the above *in vivo* experiments.

The above toxicity data were based upon a single subcutaneous dose. However, when the mice were administered neomycin in several divided doses, much greater concentrations were tolerated. One of the more toxic preparations was used and the mice were given a total of 1,500 units in 3 divided doses a day; in another experiment a total of 4,000 units was administered, in 2 divided daily doses, during a 4 day period (500 units at each injection); all the mice in both experiments survived, and, on autopsy, none showed any gross pathological changes.

If the above minimal figure is taken, namely 1,500 units daily dose per mouse in three divided doses, one should be able to inject a patient weighing 60 kg. with 4,500,000 units daily even with one of the more toxic preparations without any toxic manifestations, provided, of course, that the toxicity in man is of the same order of magnitude as in the experimental animals used in these experiments. This is still considerably below the potential toxic dose. In the case of the 2 patients reported tonight, a maximum daily dose of 600,000 units was given. This was only about one-seventh of the minimum potential toxic dose. The clinician was, therefore, taking very little chance as regards the possible toxic effect of the neomycin preparation that he has used. I want to emphasize again that the figures were minimal

figures and based upon one of the less toxic lots, a much wider ratio would have been obtained.

The two clinical cases presented tonight give us hope that neomycin may find a proper place in the chemotherapy of various infectious diseases.

The problem becomes more acute in the case of such diseases which require a much more prolonged course of treatment. This is true, for example, of tuberculosis. It has been shown both in our laboratories, as well as in many other laboratories, that freshly isolated strains of the human pathogen *Mycobacterium tuberculosis* are sensitive to between 0.1 and 1.0 unit of neomycin, mostly to less than 0.5 unit. The corresponding sensitivity of these strains to streptomycin was 1 to 5 units. This tends to show that the tuberculosis organism is more sensitive to neomycin than to streptomycin *in vitro*. Even more important, the above figures are based upon comparisons with streptomycin-sensitive strains; in the case of the streptomycin-resistant strains, which do not respond to streptomycin even in concentrations greater than 1,000 units, their sensitivity to neomycin remains practically the same.

Judging, therefore, from the facts the sensitivity of *M. tuberculosis* to neomycin, which is at least as great as to streptomycin and the equal sensitivity of streptomycin-sensitive and streptomycin-resistant cultures, combined with the fact that a daily dose of 4,500,000 units could be given to a patient weighing 60 kg., which is probably at least 3 times as great as would actually be used, one would expect *a priori* that neomycin should prove an efficient anti-tuberculosis agent. Whether that will actually be found to be the case is only for the clinical investigator to establish.

Abstract 5

CHRONIC PYELONEPHRITIS SIMULATING ADDISON'S DISEASE. A. J. Creskoff, M.D., Edward Rose, M.D., and Thomas Fitz-Hugh, Jr., M.D.

It is the purpose of this report to describe a case of chronic pyelonephritis with clinical features closely resembling those of adrenal cortical insufficiency. The patient was a thirty-five year old white female who was observed over a total period of twelve years. During the last few years of life, she exhibited clinical features which included under-nutrition, amenorrhea, tanning of the skin, hypotension, recurrent crises of prostration associated with dehydration, azotemia, and reduced concentration of total base and chloride in the blood serum. There were also episodes of hypocalcemic tetany. Three such crises occurred during the last ten months of life. The intravenous administration of sodium chloride and water produced improvement in the acidosis, azotemia, and dehydration; however, hypotension persisted. Aqueous cortical hormone and desoxycorticosterone acetate produced no additional therapeutic response. An appendiceal abscess intervened and apparently was the precipitating factor in her death. Intact adrenals were found at necropsy. The kidneys were small, soft and showed on microscopic examination a fairly diffuse chronic pyelonephritic process.

This case resembled two similar ones originally described by Thorn, Koepf and Clinton, and one later described by Sawyer and Solez. In their cases a similar clinical picture was found as well as evidence of increased urinary excretion of sodium and chloride. Necropsy evidence revealed intact adrenals, but the kidneys showed microscopic and gross evidence of severe renal damage. Thorn, Koepf and Clinton coined the term "salt-losing nephritis" as a descriptive phrase for chronic renal insufficiency simulating Addison's disease. It is believed that the case presently described fits into this classification.

Abstract 6

VANISHING TUMOR OF THE LUNG—A MANIFESTATION OF CONGESTIVE HEART FAILURE. William I. Gefter, M.D., and Katharine R. Boucot, M.D.

Vanishing tumor of the lung, or localized interlobar pleural fluid collection in congestive heart failure without free hydrothorax, is presum-

ably rare, as only 17 cases have been reported. In the past year however the authors have become acquainted with 4 cases and consequently feel that the condition is much more common than supposed. This view is supported by the radiologic observation that residual scars of pre-existing interlobal effusions have been noted in many cardiac patients. In addition to congestive heart failure, obliteration of the pleural cavity is a requisite for its development.

Most of the fluid collections involve the right transverse interlobar fissure. Physical signs are generally absent. Chest X-ray reveals the density whose shape varies from linear to round depending upon the size and position of the fluid and projection angle. Diagnosis is confirmed by prompt therapeutic response to diuresis. Differentially, one must exclude other causes of interlobar effusion such as tuberculosis, pneumonia, pulmonary infarction and rheumatic pneumonitis, as well as lesions which simulate localized interlobar collections of fluid namely, tumor, empyema, cyst, arterio-venous aneurysm, etc.

Four illustrative cases are presented in which the interlobar effusions disappear following diuresis.

Abstract 7

A Study of Intermittent Claudication.
Meyer Naide, M.D.

Since treatment at the present time directed toward increasing the blood supply fails so often to improve claudication, the idea suggested itself that perhaps one could reduce the demand of the calf muscles for blood so that it will more closely approximate the limited supply and thus delay or prevent the symptom of claudication. The walking of 30 patients with intermittent claudication was studied. It was found that the average rate of walking of both patients and of normals was between 110 to 120 steps per minute. In other words although patients with claudication believed they were walking more slowly they did not slow up until they began having pain. When patients were made to walk more slowly at an average rate of 90 to 105 steps per minute, in practically every patient claudication was greatly delayed or did not come on at all. When a patient with fixed and reduced blood supply to leg muscles is taught to walk at a slower rate he can often walk with little or no fatigue. It was also learned that a shorter step and holding the knee of the affected leg in a stiff or semi-stiff position permits patients with claudication to walk better.

List of College Lectures, 1949

5 January 1949

RENNIE, THOMAS A. C. Psychiatry in Medicine and Society (*S. Weir Mitchell Oration XI*). (*Transactions & Studies*, April, 1949.)

2 February 1949

GIBBON, JOHN H., JR. Cancer of the Lung (*Thomas Dent Mütter Lecture LXI*). (*Transactions & Studies*, June, 1949.)

*9 March 1949**

JOHNSON, VICTOR. Medical Education: the Past Century and the Future. (*Transactions & Studies*, June, 1949.)

20 April 1949

BUTLER, ALLAN M. Recent Advances in Parenteral Fluid Therapy (*Nathan Lewis Hatfield Lecture XXXIII*). (*Not made available for publication.*)

4 May 1949

SABIN, ALBERT B. Progress and Problems in Virus Diseases (*Mary Scott Newbold Lecture LXI*).(*Not made available for publication.*)

* Joint meeting with the Philadelphia County Medical Society, held in the Society's building.

5 October 1949

AIRD, IAN. The Birth and Infancy of the British State Medical Service (*Mary Scott Newbold Lecture LXII*). (*Not made available for publication.*)

9 November 1949

WANGENSTEEN, OWEN H. Studies in the Etiology and the Surgical Management of Ulcers (*Alvarenga Prize Lecture IX*). (*To be published in the Transactions & Studies, April, 1950.*)

7 December 1949

PERKINS, WILLIAM H. The Value of Health Centers to the Community (*James M. Anders Lecture XXIV, a*).**

BAEHR, GEORGE. The Role of Medical Group Practice in the Changing Order (*James M. Anders Lecture XXIV, b*). (*Published in this (February, 1950) issue of the Transactions & Studies.*)

** Not delivered, owing to the illness of the scheduled speaker.

President's Address*

By T. GRIER MILLER

Introduction

IN KEEPING with custom and its By-Laws I shall now review some of the accomplishments of the College for the past year. At the same time I shall take the liberty of presenting certain objectives for the future. An appreciation of the latter is essential to a full understanding of some of its recent activities.

For the preceding decade, due to costs rising out of proportion to its income, the financial status of the College was strained, but, as a result of the conscientious efforts of its Officers, Council and Committees, no deficit occurred in any year. This involved sacrifice on the part of the staff personnel, restriction of purchases for the Library and the postponement of needed repairs to the building.

Needs and Plans

Long before 1949 it was fully appreciated by those in intimate contact with the affairs of the College that sooner or later alterations in, and additions to, the Hall and an increase in its income for maintenance, personnel and new obligations would be required. As was to be expected after 40 years of accretions to the Library, its stacks had become filled to overflowing; with an increase in the use of the Library, its reading rooms had become inadequate; and, as a result of added gifts to the museum, its space had failed properly to house them. Also the water pipes had become eroded, the roof over Mitchell Hall had weathered and leaked, and plaster had loosened in various areas. The employees, furthermore, to meet the increased cost of living, deserved increases in salary and more security.

A committee was appointed by President Schaeffer in September, 1948, to study the physical and financial needs of the College and to propose methods of meeting them. It recommended a campaign for funds with which to construct an annex for book stacks, to meet immediate and anticipated needs, and to provide improved facilities for the accommodation of readers in the library and for continued accessions to the museum. This committee, following a suggestion made in 1946 by President Pepper, also advocated the employment of a full-time medical Executive Secretary to coordinate and enhance the activities of the various committees of the College.

In order to define more specifically the physical needs and to determine how they could be met, this committee was authorized by the Council at once to seek funds with which to secure an architectural and engineering survey of the situation. Such funds were readily donated by a limited number of Fellows (now to the extent of almost $4,000), and Mr. Robert Rodes McGoodwin was asked to accept the responsibility of the survey. After a winter's work, in which Mr. Ernest D'Ambly, a consulting engineer, was associated with him, he submitted comprehensive plans that were approved by the Council. These call for the construction on the rear portion of our Sinkler Garden, to the south of our present building, of an annex for book stacks, sufficient to double the Library's present capacity, rearrangements on the second floor of the present Hall, to double its reading room space, and alterations in the basement, to allow concentration of electrical, ventilating and heating systems in the area now reserved for heating alone, thus freeing space for considerable enlargement of the museum. At the same time, since the plans call for the conversion of Mitchell Hall into a major reading room, it was necessary to plan for a new auditorium. This, it was believed, could be best accomplished by a new one-story building on the middle portion of the Sinkler Garden, the front of the lot being left open for the Herb

* Delivered at the business meeting of the College of Physicians of Philadelphia, 4 January 1950.

Garden as at present. Such a building would not interfere with the lighting and ventilation of the present south reading room and can be constructed in keeping with the design of our present Hall.

Meantime, as of January 1st, 1949, the annual contribution of the Fellows to the College was increased from $30 to $50, this assuring an additional yearly income of about $15,000, sufficient to meet the more urgent current needs.

Thus during the past year the College has attained a more sound financial status and plans for a new building have been developed and approved. A preliminary appeal for financial support of the latter project, through a letter and a brochure, has been made to the Fellows. It is not anticipated that they alone can finance the new building in its entirety, estimated to cost about $730,000, but, if their response is prompt and generous, it is believed possible to elicit the additional financial support of certain philanthropic individuals and charitable foundations. Even if the full amount cannot be obtained at once, it is hoped that within the present year enough can be secured to construct the housing for new book stacks and to make the planned alterations in the basement. Meantime an effort will be made to secure additional endowments for the College and to develop other sources of annual income. This also is necessary to keep abreast of other large medical institutions of its kind and to maintain our prestige.

The Library

The total expenditures for the Library alone during the past year amounted to $38,883.86, over 47 per cent of the total College income. Its allotted income, including an appropriation of $7,625 from the general funds of the College, was only $32,965.21. The deficit of $5,918.65 was covered from an accumulated reserve for Library purposes of $12,224.73, thus leaving in that reserve fund only about $6,500. Of the latter, furthermore, $4,805.19 is restricted for special Library purposes.

This situation cannot continue, and now, at the urgent and fully justified request of the Library Committee, the Council has increased its appropriation to the Library from the general funds of the College to $15,000 for the year 1950.

With the acquisition of additional stacks, the steadily increasing cost of books, journals and binding and the expanding rate of scientific publications, further library operating expenses are inevitable. It is for this purpose especially that some additional means of increasing the annual income of the College, preferably by endowments, must be given consideration.

In further connection with the Library, I wish to comment on some administrative changes. At the urgent request of the Librarian, Dr. McDaniel, and at financial sacrifice on his part, he has been relieved of certain administrative duties in order that he may devote more time and effort to the educational and cultural aspects of his work. To cover other duties, under Dr. McDaniel's general direction, an associate librarian, Mr. Elliott H. Morse, functioning at present as administrative assistant librarian, was appointed as of July 1st. He formerly was head of the reference service in the Library of the University of Pennsylvania. Already he has demonstrated with us unusual capacity as an administrator and as a cooperative, effective and genial member of our permanent staff.

Donations to Library Funds. I have the pleasure to report to you three donations from Fellows that were received too recently to be mentioned in the Library's annual report.

Dr. George E. Pfahler donated $1,000, his third gift in that amount, to the fund bearing his name, which was established in 1940 with the residue of proceeds from a testimonial dinner tendered to Dr. Pfahler by his friends.

The residue of proceeds from a similar dinner tendered Dr. Francis H. Adler was put at the disposal of the Library by the Section on Ophthalmology.

Dr. J. Monroe Thorington made a gift of $150 for the purpose of enabling the Library to add to its important historical collections.

These donations are significant indications of the Fellows' wish that we make every effort

to maintain the distinguished position that the Library has long held.

The Hall

A review of the Hall Committee's report indicates that during the past year the original appropriation of $18,692, made to that Committee before the increase in the Fellows' Contributions, failed by $6,320 to meet the necessary expenditures. This is explained by certain emergencies that developed: eroded water pipes, a leaking skylight with consequent damage to the ceiling in Mitchell Hall, and a defective boiler. In addition it was important to renovate and equip a new office for the Librarian and to repaint and reequip several of the smaller rooms of the Hall. Funds were available in the reserve for maintenance of the building to cover these emergencies, but they were not so used because the increased annual income of the College was sufficient to carry the additional expense.

Executive Secretary

Another accomplishment during the year, made possible by the increased Contribution, was the procurement of a part-time medical Executive Secretary. As of May 1st, Dr. J. Harold Austin, a long-time Secretary of the College and one who had always manifested unusual efficiency in that capacity, accepted the position and already in many ways has made his experience, wisdom, tact and tireless effort count for the good of the organization. His proposals in connection with the establishment of a new pension system for the employees of the College alone is now saving the College more each year than the meager salary he receives.

Pensions

The College has always made some contribution, after his or her retirement, to each long-time employee, but this has been on an individual and irregular basis. During the past year a pension fund has been set-up on the books of the College, into which annual payments are made from its general funds, and each employee, after 10 years of service and reaching the age of 65, is entitled to a predetermined portion of his previous salary for life. This added security will be greatly appreciated by the College personnel.

Life Membership

The Council also within the year has established new provisions for Life Fellowship, the cost varying with the age of the Fellow at the time it is taken out. This, on an actuarial basis, allows the College to withdraw from a special "Life Fellowship Fund", into which these payments are deposited, the sum of $50 for each year that the Fellow lives to age 70. It permits him to make the total payment when presumably his income is greatest and his income tax the highest. It is anticipated that many Fellows will now take advantage of this opportunity.

Lay Guests

The Council has approved inviting a few outstanding and public spirited lay people to attend certain of the College's scientific meetings that might interest them and has authorized the limited use of the Mitchell Entertainment Fund in order at the same time to have them as guests at the pre-meeting dinner. The terms of gift of the Mitchell Fund specifically state "that it shall be used—to pay for any reception, converzatione or dinner which will tend toward good fellowship in the profession or help to improve its influence in the community." Thus one of our most distinguished former Presidents foresaw the desirability of interesting the public in medical affairs. To date a number of lay people have been invited and several have attended two of our meetings, on both occasions manifesting great interest in, and appreciation of, the opportunity.

Stelwagon Legacy

At this time I wish to acknowledge with deep appreciation a legacy of $3,000 from Henry W. Stelwagon, a former Fellow who died on October 18th, 1919, and whose estate has now been settled. It is directed that the income is to be used from time to time for the award of a prize of $300 to the author of an outstand-

ing paper "on any dermatological or allied subject" that shall encourage "dermatological research and observation".

Section and Committee Activities

The work of the various Sections of the College deserves comment because they supply a forum for the presentation and discussion of much of the productive work of the Fellows. Also, distinguished guests not infrequently take part in their deliberations. Often the presentations are of such nature as to be of interest to the Fellowship as a whole, and many of them deserve publication in our *Transactions & Studies*. The Publication Committee might well give thought to that source of material in its effort to increase the value of the *Transactions & Studies*. In this connection one thinks especially of the excellent lectures delivered during the past two years in the Section on the History of Medicine. These were inaugurated by its Chairman, Dr. Maurice S. Jacobs, and at his suggestion have served as a substitute for courses on the history of medicine in the five medical schools of the city. Quite appropriately the schools have made contributions to cover honoraria to the speakers. For this innovation Dr. Jacobs deserves the thanks of the College.

The Committee on Public Health, Preventive Medicine and Public Relations has continued to function in cooperation with a similar committee of the Philadelphia County Medical Society. This combined committee is now taking an active part in the new Philadelphia Charter discussions and has made noteworthy recommendations.

The Mütter Museum Committee, in addition to its routine duties, has sponsored Mrs. Ella N. Wade's excellent catalogue of the contents of the Museum. This has been published in the *Transactions & Studies* of the College, and so is now available to all the important libraries of the world. This committee also now has acquired custody of the fine Holl portrait of S. Weir Mitchell, deposited temporarily in the College Hall by his granddaughters, Mrs. Mitchell Macdonough and Mrs. Vinton Freedley.

The Herb Garden

The thanks of the College are again due the ladies who maintain the herb garden. In spite of the possibility that new construction in the near future may necessitate temporary abandonment of the garden, they have manifested an increased interest, now have a permanent horticultural supervisor and plan to go along with us in whatever procedures may be necessary to preserve this unique and fascinating feature of our College property for the future.

Fellowship Status

As to the Fellowship of our College, we now have 767 Resident Fellows, 54 Non-Resident Fellows, 2 Foreign Fellows and 9 Honorary Fellows, including 2 Honorary Associates. Nine Fellows have resigned, the Contribution of 7 has been remitted and 20, including 4 Non-Resident Fellows and one Honorary Fellow, have been lost by death.

I shall now read the list of those who have died, and, as I do so, I request that the Fellows stand.

Resident Fellows†

Henry P. Boyer
Charles J. Cole
John R. Davies, Jr.
John Diven
George M. Dorrance
Augustus A. Eshner
Arthur H. Gerhard
U. Grant Gifford
Sigmund S. Greenbaum
John H. Gunter
Alfred Hand
Arthur P. Hitchens
Daniel Longaker
Ralph Pemberton
Thomas S. Stewart

† Dates of election and death are given in the Necrological List at the end of this issue.

Non-Resident Fellows

Montgomery H. Biggs
Joseph S. Evans
Henry D. Jump
Hunter Holmes McGuire

Honorary Fellow

Sir. F. Gowland Hopkins

Memoirs will be presented at subsequent meetings for Ralph Pemberton and Alfred Hand. Memoirs have been or will be prepared and published for Joseph S. Evans, who died in 1948, and for John R. Davies, Henry D. Jump and George Morris Dorrance.

And now finally I wish to thank all the Officers, the individual members of the Council and of the various College Committees, the chairmen and the committee members of the Sections and the Fellows as a whole for their support and faithful service to the College during the past year. I also wish to acknowledge with deep appreciation the devoted service of all the employees of the College. Only by such continued loyalty on the part of all the Fellows and the staff can the College hope to maintain its eminent position and advance its service to the profession and the public.

Report of the Treasurer for the Year Ended November 10, 1949

Assets		
Cash in bank and on hand:		
General Funds	$19,301.70	
Trust Funds (Restricted)	18,447.18	$37,748.88
Investments:		
Mortgages	$78,661.86	
Bonds	179,542.60	
Preferred Stocks	238,362.99	
Common Stocks	253,690.29	
Principal Cash for Investment	31,050.98	781,308.72
Property:		
Land 15–25 South Twenty-second Street	$95,000.00	
Building	782,500.00	
Furniture and Fixtures	1.00	877,501.00
Deposits on perpetual insurance policies		9,521.28
Total Assets		$1,706,079.88
Liabilities		
General Funds:		
Life Membership Fund		$534.00
Special Committee on Survey		1,281.01
Building Fund		750.00
President's Room		525.00
Operating Funds:		
Current Operating Account	$12,917.65	
Publication Committee	333.32	
Committee on Entertainment	30.75	
Library General Account	2,566.28	
Book Fund Account	249.32	
Special Fund for Purchase of Rare Books	106.53	
Friends of Library	20.00	
	$16,223.85	
Less Overexpended balance of Harvey's "De Motu Cordis" Facsimile 1628 Edition	202.18	16,021.67
Reserve for Contingencies		190.02
		$19,301.70
Reserve for Purchase of Units in Discretionary Common Trust Fund		71,250.00
Trust Funds (Book Value)		
Library Funds	$410,443.53	
Prize and Lecture Funds	32,942.45	
Publication Funds	15,499.00	
Operating Funds	219,598.92	
Special Funds	17,099.84	
Maintenance and Reserve Fund	8,685.54	
	$711,886.28	
Deduct: Investment Losses	1,827.56	
Principal	$710,058.72	
Income	18,447.18	728,505.90
Plant Fund Principal		887,022.28
Total Liabilities		$1,706,079.88

Statement of Income and Expenses

Income:	
Investments	$35,912.05
Income Funds	499.91
Contributions from Fellows	36,054.00
Contributions for Use of Halls and Projector	1,701.00
Library	6,277.00
Miscellaneous	743.17
Total Income	$81,187.13
Expenditures:	
Administration	$7,322.48
Library	38,688.08
Building:	
Maintenance	17,400.76
Major repairs	7,041.33
Publication	2,186.33
College Collections	1,809.11
Medical Lectures	959.56
Insurance, Taxes and Audits	1,857.76
Pensions	2,610.00
Miscellaneous Expense	760.88
Total Expenditures	$80,636.29
Income in excess of Expenditures 1949	550.84

William D. Stroud
Treasurer

Annual Report on the Library*

IN EVERY way but one, the library, as is shown by the statistics below, increased its stature and usefulness. Acquisitions kept pace with the normal growth of recent non-war years; subscriptions to periodicals were modestly extended; inter-library loans appreciably increased. There is, therefore, the greater disappointment that visits to the library—and consequently the circulation of books and journals—declined to the lowest level, for a non-war year, since 1937. As the curve had been steadily ascending for the past fifteen years (with the exception of the earlier years of the war) until the institution of the contribution plan, July, 1948, when immediately it dropped sharply, it takes no talent for clairvoyance to identify at least the main causative factor in the decline.

The Contribution Plan

The plan was apparently received with much understanding and generous acceptance of its purpose, which was to bring added financial support to the library. The objective was achieved in perhaps a measure reasonable for the first year of operation. But the resulting loss of so many users of the library is not agreeable to contemplate from any point of view.

After the plan had been in operation for a full year, the Library Committee reviewed the situation carefully. On one side, they were faced with the falling off in use of the library, which every one deplored. On the other, there was the very tangible increase in income, which, though it by no means solved the library's acute financial problem, at least brought a small measure of relief; and there was the awareness that under the plan the library was still completely free to anyone for reading and reference. With the financial problem still far from being solved, there appeared to be no other realistic course than to continue the plan. There was considerable evidence, however, that the Fellows and other users of the library do not have the terms of the plan clearly in mind. It was decided, therefore, to take every opportunity to remind them that the library remains completely free for reading; and that free borrowing privileges may still be conferred by the Fellows on 1) personal assistants paid by them; 2) undergraduate medical students, and interns; 3) short-time visitors in the city.

Financial Problem

That the financial problems of the library remain acute has already been indicated. It may be briefly stated here that, against income from endowments that has remained practically static over the past decade, the library is trying to cope with: inadequate stack and staff space, and staff salaries; greatly increased costs of books, journals, binding, and supplies; the constantly expanding rate of publication in the medical sciences. Those jealous for the prestige of the old and famous library, all members of the community who have profited directly or indirectly from its public spirited course, will surely want to be advised that the time is here and now for decisions which will determine whether the library is gradually to lose stature and usefulness, or whether its period of greatest value to the community is only just beginning. The latter status is one of the noble values that money *can* buy.

It is a pleasure, in this connection, to record that the library was again assisted in its efforts to serve the community at large by a grant of $1,000 from the Smith, Kline and French Laboratories.

Administrative Changes

We now approach a still newer development than the contribution plan—and one which, it is hoped, will appreciably increase the library's ability to mine more effectively its now

* 1 November 1948–31 October 1949.

only partially tapped bibliographical resources and potential services. The growth of the library's varied collections, the marked increase in use of the library, advances in library techniques, the always expanding horizon of medicine, the public obligations of the head of a large research library—all combined to press home the fact that our administrative set-up was no longer adequate for the large functions which the library seems in duty bound to perform. The librarian, therefore, proposed a division of responsibilities between a head librarian, who would administer the library and assume the public obligations of the head of the library, and an associate librarian who would concern himself with organizing, developing, and publicizing the library's exceptionally distinguished, but largely unused, reference and cultural collections. The Library Committee and the College administration accepted the proposal and it is on its way to the objective outlined. The first milestone was passed with the appointment of Mr. Elliott H. Morse as administrative assistant librarian, effective 1 July 1949. A graduate of Haverford College, and of the Drexel Library School, Mr. Morse was, at the time of his appointment, head of the reference service at the University of Pennsylvania library. The next milestone in the plan would find the administrative assistant librarian assuming the librarianship, with the present librarian turning his attentions exclusively to the concerns of an associate librarian for reference and historical medicine. Thus, the library would be developing logically along lines long ago laid out by libraries of comparable stature.

The Historical Collections

While some modern historical studies of obvious permanent value or special interest were acquired by purchase, funds were not available for puchases in the more expensive field of the rare book. Yet, there were some acquisitions that merit notice here. One of them is, strictly speaking, not a new acquisition at all, but since the statistics below indicate the acquisition of an incunable, it is well to make the circumstances a matter of public record. The work concerned is Johannes Widmann's *Tractatus de pestilentia*, Tübingen, 1501. Our copy was acquired in 1901 as an item in the famous Stockton Hough collection. As the so-called incunabula period ends with the year 1500, the work was not treated as an incunabulum by our predecessors but was indeed reposing on an open shelf in the stacks, where we were led to it through the checking of a bookdealer's catalogue. An investigation made it clear that it was proper for us to transfer the little work to the incunabula collection, pending any later contradictory bibliographical treatment of it, and that was done. Only one other copy of the important plague tract is recorded as being in an American library. However, rare as the edition undoubtedly is, the fate of our copy makes it seem likely that other copies may similarly have eluded the compilers of incunabula catalogues that give the location of copies.

The donor of our notable Bradley Collection of Photographs of Philadelphia Physicians As Portrayed in Art, William N. Bradley, M.D. made another donation representing years of painstaking research. This was a handsomely-bound, 2-volume compilation of copies of all the known records bearing on the life and works of the College's first president, Dr. John Redman. It is obvious that Dr. Bradley will be blessed in the future, as well as the present, by every student of the life and works of one of the most attractive and influential Philadelphia physicians of the 18th century.

Oslerites well know that one of his favorite works in the lighter vein was Dr. John Brown's "Rabb and His Friends". It will please them to know that the library received a copy of a rare, illustrated edition from Dr. Douglas Guthrie, the eminent Scottish medical historian, on the occasion of an address he delivered before the College's Section on Medical History.

Our collection of student notes on the lectures of Benjamin Rush was augmented by two volumes graciously presented by Mr. G. H. Arrow.

As so often in the past, the largest and some

of the most important donations—in both the current and historical fields—came from our former chairman, and former president of the College, Dr. E. B. Krumbhaar. In the historical field, we welcomed, as gifts from his own library, among other donations, such interesting texts as the following: 1) *Institutiones Medicae*, a legibly written, comprehensive student's notebook, in Latin, which gives us the subjects of physiology and pathology as they were taught at Montpellier in 1745; 2) Johann Christian Gottlieb Ackermann's *Ueber die Krankheiten der Gelehrten*, Nürnberg, 1777; 3) the same author's collection of medico-historical texts of some of his contemporaries, *Opuscula ad Medicinae Historiam Pertinentia*, Nürnberg, 1797; 4) the Leyden, 1739, edition of William Cowper's *Anatomia Corporum Humanorum*, the plates of which were plagiarized from Bidloo; 5) the Ulm, 1661, edition of Johannes Rümelin's *Kleine Weltspiegel*, one of the earliest anatomic atlases with superimposed plates, of which the library had already the exceedingly rare separate three plates ("fugitive sheets") of the first edition, 1613; 6) Günther of Andernach's recension of the works of Paul of Aegina, *Pauli Aeginetae Medici Opera*, Lyon, 1551; 7) a manuscript recipe in the hand of John Fothergill, the famous English physician and benefactor of Philadelphia medicine in the middle of the 18th century. While these do not represent by any means the sum total of this donor's contributions to our historical collections during the year, they serve to indicate again how much the collections are indebted to him year after year.

Exhibits

The exhibit of the year, from the standpoint of public response, was unquestionably that prepared in commemoration of the one-hundredth anniversary of the birth of Sir William Osler. It consisted of books given to the library by Osler, and of bookish Osler letters in our possession. Happily, it illustrated, without need or suggestion of artifice, both the wide learning and the endearing personality of the man. One's line of thought ran, now, from the ancient texts of Celsus and Galen—the one in its first printed edition and bearing the owner's inscription of Giorgio Antonio Vespucci, uncle of Amerigo; the other, the famous Aldine Greek text in five volumes—through the precious 14th century manuscript of Bernard of Gordon's "principles and practice of medicine", quaintly entitled *Lilium Medicinae*, to the latest French *Traité de Médecine* (Charcot, Bouchard, Brissaud). Then we saw reflected his admiration for such inquiring minds as those of the physician-naturalists Aldrovandi, Linnaeus, Wotton; of the physician-philosophers Locke and, of course, Sir Thomas Browne. There was a Jenner and a Tuke to remind us of the humanitarian. There was the only known copy of the secret London imprint of *First and Last*, an epic poem by our own George B. Wood, better known as co-originator of the *Dispensatory of the United* States (1833); and a novelized biography (*The Modern Sphynx*, by Lieut.-Col. E. Rogers) of a woman army surgeon—to remind us that nothing touching on medicine and its practitioners was alien to the interest of this born physician. In an Osler letter resting against a collection of varied, all very valuable, tracts in a 16th century binding, we read: "There is another explanation of the bosses at the corners, and that is that they prevented the spilt beer on the table damaging the binding!" The exclamation mark is Osler's. Altogether, it was, someone remarked, as though Osler walked again.

The second series of medical history lectures for students presented by the College's Section on Medical History was scheduled for Monday evenings, so that the students might find the library open. For each of the ten lectures on consecutive Monday evenings a special exhibit was prepared illustrating the literature of the period covered by the lecture. It was a welcome opportunity to introduce the students to the wealth of primary and secondary source material available in the library; it is gratifying to be able to report that the exhibits attracted an uncommon amount of attention from this group of students.

Staff Activities

The first-year class of the Woman's Medical College received, from members of our staff, their annual demonstration of the resources of the library and how to make use of them. An "Open House" demonstration was afforded the members of the Special Libraries Council of Philadelphia, on the occasion of a meeting held in the College building.

Mr. Morse, the new administrative assistant librarian, served as able head of the library, during the librarian's absence on vacation, for the first two of the four months he has been with us, and, at the same time, accustomed himself to still other new duties as president of the Special Libraries Council.

Mrs. Maines, the assistant in charge of circulation, served as treasurer of the Social Science Group of the Special Libraries Council, as a member of the membership committee of its Science-Technology Group, and as a member of the hospitality committee of the Council. Mrs. Bready, the assistant in charge of current periodicals, served as chairman of the Medical Library Association's Committee on Periodicals, and represented the library at the annual meeting of the Association, at Galveston.

The librarian continued to serve as a member of the Medical Library Association's Committee on a Coördinated Abstracting Service for Clinical Medicine, and as editor of the College's *Transactions & Studies*. He attended the annual meeting of the Association of Honorary Consultants to the Army Medical Library, held in Washington. A review by him of Solomon R. Kagan's *Fielding H. Garrison: a Biography* appeared in the *Bulletin of the Medical Library Association*, January, 1949; and *Sanford Vincent Larkey, M.D.* (a sketch of the new president of the Association), in the July, 1949, number of the same journal.

To all the members of the staff—those named above and those unnamed (among the latter, most especially, the assistant cataloguer, Miss Gertrude Cirotti, and our general factotum, Miss Kathryn Haegele)—the librarian and the administrative assistant librarian are deeply grateful for excelling sportsmanship and able performance of duties that frequently transcended routine.

The staff roster, as of 31 October 1949, follows:

Librarian
W. B. McDaniel, II

Administrative Assistant Librarian
Elliott H. Morse

Head Cataloguer
Miss Eunice E. Sharp

Assistant in Charge of the Reading Room
Mrs. Maud G. Maines

Assistant in Charge of the Periodicals Room
Mrs. Elizabeth F. Bready

Assistant Cataloguer
Miss Gertrude C. Cirotti

Secretary to the Librarian and General Assistant
Miss Kathryn E. Haegele

Photostat Operator and Page
Miss Jane Walton

Pages
Miss Kathryn Houston
Miss Ida Hund

Inventory

	1949	*1949*	*1948*	*1948*
Total number of accessioned[1] items		171,275		168,925
Incunabula	416		415	
Manuscripts (including a few typescripts)	723		695	
General	170,136		167,815	
	171,275		168,925	

LIBRARY OF THE COLLEGE OF PHYSICIANS OF PHILADELPHIA

Total number of unaccessioned[1] *items*		324,278	322,593
Reports	26,824	26,749	
Periodicals "reserve"[2]	7,846	7,267	
Theses and Dissertations	53,590	52,961	
Pamphlets	235,018	235,616	
	324,278	322,593	
Total number of current periodical publications regularly received		1,346	1,297
Portraits[3]		73,827	70,735

Distribution of This Material

	Accessioned Items	Unaccessioned Items
General Library (including the Lewis Library)	167,011	324,274
On permanent deposit:		
Gross Library	3,847	4
Parry Library of the Obstetrical Society of Philadelphia	217	0
Mütter Museum[4]	200	0
	171,275	324,278

Current Periodicals

	Purchased	Exchange or Gratis	Annuals	Total
U. S. A.	253	318	57	628
Western European Continent	353	26		379
Latin America	30	76	4	110
United Kingdom and Eire	101	39	4	144
Canada	2	23	2	27
Eastern European Continent	14	1		15
Asia	12	12		24
Africa	2	5		7
Pacific Area	4	8		12
Grand Totals, 1949	771	508	67	1,346
Grand Totals, 1948	775	462	60	1,297

New titles: A total of 79 periodicals was added to the Norris Room in 1948–49. Sixty-five of these were purchased, 14 received in exchange or gratis. Thirty-seven began with volume 1.

Separate Issues received, checked-in on the cards, and shelved totaled 13,755. In addition, thousands of duplicate issues were received, as usual; 579 of these were retained for our 'reserve' files, no attempt being made to count those held merely for exchange or other use.

Visitors to the Norris Room for the year totaled 5,174.

---

[1] Our 'accessioned item', or 'volume', normally contains not fewer than 100 pages, usually is bound, and always is catalogued. It may comprise a part of a 'book' or periodical 'volume', one or more complete 'books' or periodical 'volumes', a collection of reports, pamphlets, or theses. In a few instances, the term applies to miscellaneous items such as a photograph album or a large collection of correspondence or private papers.

The 'unaccessioned item' is intended to apply to (usually unbound) pamphlets, reports, theses, or other material of fewer than 100 pages; only a part of this material is catalogued. It should be stressed, however, that in this category are included uncounted thousands of reports and theses of 100 pages or over, as well as smaller classic items, which would quite properly figure in the 'number of volumes' claimed by other libraries, and which would indeed figure among our 'accessioned items', had our predecessors and we ever been able to accession and catalogue them.

[2] More-or-less complete duplicate volumes of periodicals.

[3] Including 118 oil, and 429 other, framed portraits in the care of the Committee on College Collections. The count of portraits represents the number of entries on the cards in the portrait catalogue. The entries represent, in turn, both loose portraits and those in books, many of them, of course, being merely different reproductions of a single original.

[4] The books of the Mütter Museum are not permitted to be removed from the College building.

Readers' Use of the Library

Library Hours. The library was open, during the academic year, from 9:30 to 9:30 on Mondays and Wednesdays; from 9:30 to 5:30 on the other weekdays. During June, July, August (except August 1–14 when the library was closed for repairs), and the first half of September the library was open from 1 to 9:30 on Wednesdays; from 9 to 5 on the other weekdays, except Saturdays, when it was closed. The following legal holidays were observed: Thanksgiving (beginning at 5:30 on the preceding evening), Christmas and New Year's (beginning at 1 on the preceding days), Memorial, Independence, and Labor Days.

Number of visitors:

	1949	1948	Totals 1949	Totals 1948
Days (including evenings)	(287)	(293)	12,014	15,777
Circulation of books:				
Number of volumes taken out (Books: 2,496; Periodicals: 4,339)			6,835	7,420
Number of volumes consulted in the library[5]			60,707	71,720

Inter-library loans: The library sent 2,373 (1948: 2,164) volumes on inter-library loan to 119 libraries in 29 States and Canada and has borrowed 5 (1948: 7) volumes from 3 (1948: 4) libraries.

Photostats: 2,220 photostatic prints were furnished on request (1948: 3,120).

Acquisitions and Accessions

Accessioned Acquisitions:

1949: 2,350 volumes (1,513 by purchase; 656 by gift; 181 by exchange). (Books: 858; Periodicals: 1,492).

1948: 1,725 volumes (1,056 by purchase; 507 by gift; 162 by exchange). (Books: 778; Periodicals: 947).

Non-accessioned Acquisitions[6]:

1949: 315 Pamphlets (1948: 384).
75 Reports (1948: 94).
629 Theses (1948: 662).

Donations

The donors for the past year number 257 (1948: 281). The library is indebted for large gifts of books, pamphlets, and unbound periodicals to the following donors:

Drs. E. J. G. Beardsley, S. Bellet; Biological Abstracts; Boston Medical Library; Drs. K. Chouké, L. L. Corielle, W. A. N. Dorland, A. A. Eshner, C. L. Jackson; Jefferson Medical College; Dr. E. B. Krumbhaar; LaWall & Harrisson; Lea & Febiger; J. B. Lippincott Co.; Dr. C. W. Muckle; National Research Council Library; W. B. Saunders Co.; Smith, Kline & French Laboratories; South African Institute for Medical Research; Dr. H. J. Tumen; University of Pennsylvania; Dr. I. J. Wolman; Woman's Medical College; Wyeth, Inc.; Dr. W. Zentmayer.

Various publishing houses have presented volumes as follows: Blakiston Co., 11; F. A. Davis Co., 9; Lea & Febiger, 13; J. B. Lippincott Co., 35; W. B. Saunders Co., 66.

Other individual donors were as follows: Drs. A. S. Alving, J. D. Aronson, M. Asbell, J. T. Bauer, H. Beerman, N. Blumberg, W. G. Bowerman, W. N. Bradley, C. C. Burlingame; C. W. David; Drs. H. Dittrick, E. L. Eliason; Prof. C. U. Faye; Drs. E. J. Garvin, J. M. Gelwix; J. E. Gibson; Dr. D. Guthrie; Estate of Dr. S. McC. Hamill; Dr. A. Hand; Mrs. L. M. Hartman; Drs. W. P. Havens, E. M. Hiller, E. F. Horine, R. H. Ivy, L. Kindall, J. V. Klauder, M. H. Knisely; Mrs. M. M. Knowlton; Drs. R. M. LeComte (through Dr. C. A. W. Uhle), W. E. Lee, F. H. Lewy; W. B. McDaniel; W. B. McDaniel, 2d; Dr. T. H. McGavack; R. F. Metzdorf; Drs. O. W. H. Mitchell, C. M. Morris, S. Mudd; Miss E. L. Neider; Miss J. Oppenheimer; Drs. H. W. Orr, W. Overholser, J. R. Paul, G. E. Pfahler, A. Plenk; W. D. Postell; Drs. L. C. Scheffey, T. G. Schnabel, L. H. Smith, E. W. Thomas, J. M. Thorington; Mrs. J. C. Trent; Drs. W. P. Vail, W. S. Wadsworth, J. H. Welsh, A. S. Wiener, DeF. P. Willard.

Exchanges

The *Transactions & Studies* was sent, either as gift or in exchange, to 231 organizations.

The library received a number of journal issues through the Medical Library Association Exchange.

Theses and dissertations to the number of 629 have been received on exchange from the following European schools of medicine: Universities of Bern, Copenhagen, Geneva, Jena, Lausanne, Leiden, Louvain, Lund, Paris, Utrecht.

[5] The number of volumes "consulted in the library" includes only those supplied on demand. Readers have access to the bound volumes of periodicals and reference works kept on the shelves in the Reading Room; the Fellows, and occasionally others, by special permission, have access to the book-stacks. There are, therefore, many volumes consulted of which no accurate record can be kept.

[6] As usual, not all the pamphlets, theses, and numbers of various journals listed as received had been checked for keeping or discard at the close of the library year.

Work of the Cataloguers

	1949	1948
Accessioned items catalogued or recatalogued	653	744
Unaccessioned pamphlets and Fellows' reprints catalogued by author or by author and subject	387	1,791

Approved:
Truman G. Schnabel
Chairman

W. B. McDaniel, 2d
Librarian

Annual Reports of the Committees on the Mütter Museum and College Collections

The Museum

The Mütter Museum was open to Fellows of the College, physicians and the general public on days when the College building was open, from 10:00 to 1:00 and from 2:00 to 5:00, except Saturdays when it was open from 9:30 to 1:00. It also was open on the evenings of the Stated Meetings of the College until 8:30. There were 1257 visitors to the museum during the year, and it is interesting to note, in reviewing the register for the past ten years, that visitors have registered from 546 cities in 46 of the 48 states and from 69 cities in 31 foreign countries and numerous islands.

The Sixty-first Thomas Dent Mütter Lecture was given February 2, 1949, by John H. Gibbon, Jr., M.D., who spoke on *Cancer of the Lung*. The lecture was published in the June 1949 issue of the *Transactions & Studies* of the College.

Publication of the entire Mütter Museum Catalogue was completed during the year and reprints of the five installments in the *Transactions & Studies* were bound under a single cover, making 175 copies available to interested institutions and individuals.

The usual arthritis and ankylosis specimens from the museum were used to illustrate the annual discussion for graduate students, led by Drs. Joseph L. Hollander, Clyde H. Kelchner, Morris A. Bowie, and C. W. Scull.

Mrs. Ella N. Wade was reappointed curator and clerk-technician for the year 1948–1949.

Accessions to the permanent collection of the Mütter Museum for the year, and falling under the provision of the Mütter Deed of Gift, are as follows:

Presented by Dr. William S. Wadsworth:
- Polypus forceps
- Husson's sponge forceps
- Skudder's intestinal forceps
- Doyen's intestinal forceps
- Abdominal retractor
- Murphy's retractor
- Two hernia knives
- Seiler's hernia knife
- Vulsella forceps
- Curved-blade scissors
- Two retrojecting tubes for male urethra
- Toynbee's ear forceps
- Set of dental instruments from Geneva, date 1894
- Rectal syringe

Presented by Dr. George W. Norris:
- Set of Southey's tubes

Presented by Dr. Joseph F. Ulman:
- Liebreich ophthalmoscope
- Thumb lancet

Presented by Dr. J. Monroe Thorington:
- C. H. Fitch's pocket prescription scale, date 1885

O. V. Batson
Chairman

The College Collections

Mrs. Ella N. Wade was reappointed custodian of College Collections.

Accessions to College Collections were as follows:

Presented by Dr. Joseph D. Aronson:
- Two bronze medals—
  - Albert Calmette
  - Louis Pasteur

Presented by Dr. T. Grier Miller:
- Gold medal of Wilhelm Conrad Roentgen

Presented by the American Laryngological Association through its secretary, Dr. Louis H. Clerf:
- The Henry L. Wagner collection of bones, histological slides and anatomical transparencies.

Presented by Dr. Irving J. Wolman:

Badge of the A. M. A.—Chicago, 1948.

Badge of the A. M. A.—Atlantic City, 1949

The College also came into temporary possession of the excellent Holl portrait of S. Weir Mitchell, M.D., which was loaned to the College by Mrs. Mitchell Macdonough and Mrs. Vinton Freedley, granddaughters of Dr. Mitchell, and joint owners of the portrait.

O. V. BATSON
Chairman

Annual Report of the Publication Committee

The committee begins its report by quoting from the annual report of the editor, as follows:

"This report covers the four numbers of the *Transactions & Studies* published within the College's fiscal year ending 10 November 1949: namely, vol. 16, nos. 3 and 4, and vol. 17, nos. 1 and 2.

"The total number of pages published was 206, an increase of 6 over the number of pages in the preceding four numbers. This was the first post-war fiscal series of four numbers that was uniformly printed in the type-sizes used immediately prior to the war. It is, therefore, possible to provide the committee with a reasonably valid comparison of pre-war and post-war costs.

"The format remains the same as it was during the fiscal year ending 30 November 1941, the year used as the base for the comparison. Editorial office expenditures were negligible in both years. The sole added expense initiated by the College as publisher was an increase of 100 in the number of copies per issue printed. Against this minor factor of expense, and over-balancing it, should be offered the fact that the 1941 series was more extensively illustrated by far than the 1949 series. Thus, the comparison is reduced, essentially, to one of costs of printing and mailing before and after the war.

"The total number of pages published, with considerable half-tone and other illustration, in the 1941 series was 250. The 1949 series contained 206 pages, with considerably less illustration. Total publication expenditures for the 1941 series amounted to $1,469.27; for the 1949 series, to $2,186.23. In short, costs, in 1949, were 33% higher for a series of four numbers that contained 18% fewer pages. The overall per-page cost rose from $5.88 to $10.61, an increase of a fraction over 80%.

"As last year, three out of the eight scientific lectures were not made available for publication. Those missing were the Alvarenga Prize Lecture, by Melvin H. Knisely, Ph.D.; Dr. Allan M. Butler's Hatfield Lecture; and the Newbold Lecture delivered by Dr. Albert B. Sabin. The editor feels obligated to refer again to the difficulty of producing issues of substance and wide interest when the full complement of scientific lectures is not made available for publication.

"The appearance of the fifth installment of the Mütter Museum Catalogue, in the June, 1949, issue, brought to completion our publication of the catalogue. This constitutes the first printed catalogue of the Mütter Museum since it was united with the College's pathological museum, in 1863, and also, we are told, the only modern catalogue in print of a collection of similar scope in this country. The publication necessarily reduced the number of historical studies of greater reading interest that could be published, but the College's journal has obviously performed an appropriate function in making this important record generally available."

The difficulties mentioned in the foregoing Editor's Report concerning the obtaining of papers from lecturers who appeared before the College were gone into in considerable detail at a recent meeting of the Council. At that time it was decided that the Publication Committee should notify all lecturers who have agreed to speak before the College this year that they were expected to present a manuscript for publication. This has been done.

It was also decided that the executive secretary of the College would be responsible next year for seeing that all men invited to lecture were informed of their responsibility, to present their manuscript for publication, at the time they delivered the lecture.

The committee wishes to express its appreciation to Mr. W. B. McDaniel, 2d, the editor, for his unselfish, painstaking and effective efforts in regard to publishing the *Transactions & Studies* for the College of Physicians.

A summary of receipts and expenditures follows:

Financial Summary

Receipts

Appropriation	$1,369.65	
Sale of *T & S*	56.25	
Pathological Soc. of Phila. (for printing its proceedings)	42.00	
Income from publication funds	674.56	
Additional appropriation	90.00	$2,232.46

Expenditures

Printing and mailing	$2,096.60	
Stenciling envelopes	23.20	
Envelopes	15.00	
Secretarial assistance	40.00	
Editorial office (postage, etc.)	11.43	$2,186.23
Balance returned to the College		$46.23

Francis C. Wood
Chairman

Annual Reports of the Sections*

General Medicine

Seven meetings of the Section were held during the calendar year 1949. Membership for 1949 was 164. Fourteen terminated membership; nine new members were added during the year.

Abstracts of most of the papers presented at the meetings of the Section were published in the *Transactions & Studies* of the College; one paper was published in full.

William A. Jeffers
Clerk

Medical History

Two regular meetings were held during 1949 with an average attendance of 105. The total membership in the Section is 69.

For the second consecutive year the Section participated in a project with the Philadelphia medical schools in which ten lectures on medical history were given from October 10th through December 12th. The total attendance at these lectures was 1063. At each session a different Dean or officer of the College acted as chairman. Mr. McDaniel, Librarian of the College, arranged interesting and appropriate exhibits in conjunction with each lecture.

Herbert T. Kelly
Clerk

Ophthalmology

The total membership in the Section is now 62. Of this number 60 have paid their dues. There were seven meetings during the year, with an average attendance of 115.

The Twelfth Annual de Schweinitz Lecture was delivered by Dr. Arthur J. Bedell of Albany, New York, on November 17th.

The Zentmayer Prize was awarded to Dr. Frederick Harbert for his paper, "Ewing's Tumor of the Orbit", presented on December 16th, 1948.

M. Luther Kauffman
Clerk

Otolaryngology

During the current year there were held five meetings of the Section at the College of Physicians building. A sixth meeting (in March) was held in New York with the Section on Otolaryngology of the New York Academy of Medicine. The Executive Committee omitted the October meeting because of the conflict with the meeting of the American Academy of Ophthalmology and Otolaryngology, held in Chicago. The average attendance at the home meetings was 20 Fellows and 47 guests. Twenty-nine Fellows attended the meeting in New York.

The present membership of the Section consists of 3 Honorary Fellows and 60 Active Fellows.

Edward H. Campbell
Clerk

Public Health, Preventive and Industrial Medicine

Four meetings were held during the year. A paper presented at the April meeting was published in the December, 1949, number of the College's *Transactions & Studies*.

There are thirty-one paid members of the Section.

A. C. LaBoccetta
Clerk

* The programs of the Section meetings are published in the June and February numbers of the *Transactions & Studies*.

Fellows

December 31, 1949

ELECTED

1948. Adelizzi, Richard A., 1723 S. Broad St.
1926. Adler, Francis Heed, 313 S. 17th St.
1949. Aegeter, Ernest E., 3400 N. Broad St.
1914. Aiken, Thomas G., Berwyn, Pa.
1936. Alexander, Fay Knight, Germantown Professional Bldg., Greene and Coulter Sts.
1947. Allbritten, Frank F., Jr., 1025 Walnut St.
1906. Allen, Francis Olcott, Jr., Secane, Pa.
1932. Allen, Frederick H., 1711 Fitzwater St.
1935. Alpers, Bernard J., 111 North 49th St.
1905. Anspach, Brooke M., 116 Mill Creek Rd., Ardmore, Pa.
1930. Appel, Kenneth E., 111 N. 49th St.
1905. Appleman, Leighton Francis, 308 S. 16th St.
1935. Armitage, George L., 400 E. 13th St., Chester, Pa.
1922. Arnett, John H., 2116 Pine St.
1942. Aronson, Joseph D., Henry Phipps Institute, 7th and Lombard St.
1920. Astley, G. Mason, 812 N. 63rd St.
1944. Atkins, Joseph P., 1201 Knox Rd., Wynnewood, Pa.
1935. Atlee, John L., 37 E. Orange St., Lancaster, Pa.
1935. Atlee, John L., Jr., 37 E. Orange St., Lancaster, Pa.
1914. Austin, J. Harold, 821 Maloney Clinic, Univ. of Pa.
1935. Bach, Theodore F., 1900 Rittenhouse Sq.
1942. Bachman, Carl, Univ. of Pa. Hospital.
1937. Bacon, Emily P.,1930 Chestnut St.
1946. Baker, Walter W., 255 S. 17th St.
1916. Balentine, Percy L., 407 Weightman Bldg., 1524 Chestnut St.
1898. Balliet, Tilghman M., 3920 Sansom St.
1940. Barba, Philip S., 222 W. Harvey St.
1943. Barden, Robert P., 3400 Spruce St.
1911. Barnard, Everett P., 1820 Rittenhouse Sq.
1939. Barnshaw, Harold D., 406 Cooper St., Camden, N. J.
1939. Bartle, Harvey Jr., 133 S. 36th St.
1924. Bartle, Henry J., 1930 Chestnut St.
1931. Bates, William, 2029 Pine St.
1932. Batson, Oscar V., 3502 Hamilton St.
1921. Bauer, Edward L., 1609 Spruce St.
1933. Bauer, John T., 312 E. Second St., Moorestown, N. J.
1939. Baumann, Frieda, 1930 Chestnut St.
1922. Bazett, Henry C., Medical School, Univ. of Pa.
1908. Beardsley, E. J. G., 1919 Spruce St.
1930. Beardwood, Joseph T., Jr., 2031 Locust St.
1949. Beecham, Clayton T., Greene & Coulter Sts.
1935. Beerman, Herman, 2422 Pine St.
1932. Behney, Charles A., 3722 Chestnut St.
1942. Behrend, Albert, 255 S. 17th St.
1945. Behrend, Bernard, 5910 Greene St.
1934. Behrend, Moses, 255 S. 17th St.

1949. Beizer, Lawrence H., 255 S. 17th St.
1930. Belk, William Parks, Times Medical Bldg., Ardmore, Pa.
1936. Bell, Benjamin Tertius, Abington Memorial Hospital, Abington, Pa.
1947. Bellet, Samuel, 2021 Spruce St.
1943. Berk, J. Edward, 255 S. 17th St.
1941. Bernstein, Mitchell, 1321 Spruce St.
1937. Bertolet, J. Allen, 1530 Locust St.
1934. Biddle, Sydney Geoffrey, 255 S. 17th St.
1918. Billings, Arthur E., 2020 Spruce St.
1917. Birdsall, Joseph C., 139 Booth Lane, Haverford, Pa.
1949. Bishop, Edward H., 255 S. 17th St.
1933. Bishop, Paul A., Pennsylvania Hospital.
1944. Blady, John V., 340 Fishers Rd., Bryn Mawr, Pa.
1917. Block, Frank B., 136 S. 16th St.
1949. Blumstein, George I., 1614 Locust St.
1929. Bockus, Henry L., 250 S. 18th St.
1928. Boles, Russell S., Rittenhouse Plaza.
1923. Bond, Earl D., 111 N. 49th St.
1911. Bonney, Charles W., 255 S. 17th St.
1948. Bookhammer, Robert S., 2031 Locust St.
1931. Bortz, Edward Le Roy, 2021 W. Girard Ave.
1921. Borzell, Francis Frank, 4940 Penn St.
1936. Bostwick, Delazon Swift, 106 Linwood Ave., Ardmore, Pa.
1928. Bothe, Albert E., 255 S. 17th St.
1928. Bothe, Frederick A., 255 S. 17th St.
1947. Bourland, Henry S., 2029 Delancey St.
1923. Bower, John O., 2008 Walnut St.
1942. Bowie, Morris A., Rosemont, Pa.
1925. Boykin, Irvine M., 136 S. 16th St.
1907. Bradley, William Nathaniel, 1725 Pine St.
1942. Branen, William, Whitby & Cypress Ave., Yeadon, Pa.
1921. Bransfield, John W., 2101 Spruce St.
1948. Braun, William, 406 Cooper St., Camden, N. J.
1946. Brisco, Clarence Conway, 255 S. 17th St.
1948. Brogan, Edmund James, 255 S. 17th St.
1917. Bromer, Ralph S., 318 Milbank Road, Bryn Mawr, Pa.
1936. Brown, Charles L., 1030 Indian Creek Rd.
1936. Brown, Clark E., Lankenau Hospital.
1932. Brown, Claude P., 1930 Chestnut St.
1948. Brown, Robert Bruce, 17th & Pattison Ave.
1939. Brust, Raymond W., 4710 Chester Ave.
1930. Bucher, Carl Joseph, The Westbury, 15th & Spruce Sts.
1943. Buerki, Robin C., University of Pa.
1928. Burden, Verne G., 255 S. 17th St.
1940. Burnett, W. Emory, 3401 N. Broad St.
1941. Butler, Miriam, 1930 Chestnut St.
1906. Butler, Ralph, 1930 Chestnut St.
1907. Cadwalader, Williams B., 133 S. 36th St.
1928. Campbell, Edward H., 133 S. 36th St.
1944. Campion, Richard J., Penllyn Rd., Springhouse, Ambler, Pa.
1931. Cantarow, Abraham, 1025 Walnut St.
1935. Carey, Lawrence S., 330 S. 9th St.
1931. Cariss, Walter L., 2043 Walnut St.

1930. Carpenter, Chapin, 1930 Chestnut St.
1905. Carpenter, Herbert B., 1805 Spruce St.
1926. Carpenter, Howard Childs, 1805 Spruce St.
1917. Carson, John B., 1802 Pine St.
1922. Case, Eugene A., 63 W. La Crosse Ave., Landsdowne, Pa.
1937. Castallo, Mario A., 1621 Spruce St.
1943. Castigliano, S. Gordon, 1012 Hampstead Rd., Penfield Downs, Del. Co., Pa.
1949. Caswell, H. Taylor, Greene & Coulter Sts.
1933. Chamberlain, W. Edward, Temple University Hospital.
1939. Chamberlain, George W., Reading Hospital, Reading, Pa.
1900. Chance, Burton, 317 S. 15th St.
1945. Chance, Burton, Jr., 1726 Spruce St.
1948. Chapman, John P., Lincoln-Liberty Building.
1939. Charr, Robert Kyun Hyun, 2038 Locust St.
1941. Cheleden, John, 255 S. 17th St.
1947. Chouké, Kehar S., 4111 Walnut St.
1945. Cianfrani, Theodore, 1930 Chestnut St.
1939. Ciccone, Emmet F., 2021 Murray St.
1929. Clark, Eliot R., 315 S. 41st St.
1934. Clark, Jefferson Hamer, 3701 N. Broad St.
1947. Clark, Thomas Williams, 400 E. Willow Grove Ave.
1947. Classen, Charles H., Cushman Rd. and Lancaster Ave., Rosemont, Pa.
1926. Clerf, Louis H., 1530 Locust St.
1910. Cloud, J. Howard, 111 St. Pauls Road, Ardmore, Pa.
1903. Coates, George Morrison, 1721 Pine St.
1908. Codman, Charles A. E., S.E. Corner 42d and Spruce Sts.
1941. Cohen, J. Gershon, 255 S. 17th St.
1949. Cohen, Louis, 255 S. 17th St.
1949. Cohen, Louis B., 1320 Arrott St.
1907. Cohen, Myer Solis-, 2110 Spruce St.
1934. Colgan, Robert C., Bridgeport, Pa.
1934. Collins, Leon Howard, Jr., 133 S. 36th St.
1943. Colonna, Paul C., Univ. of Pa. Hospital.
1949. Conger, Kyril B., 422 Drayton Rd., Oreland, Pa.
1945. Coonel, Pauline, 47 E. Mt. Pleasant Ave.
1930. Cooper, David A., 1520 Spruce St.
1947. Coppolino, John F., 1807 S. Broad St.
1941. Cornelius, Chalmers E., 119 Summit Ave., Jenkintown, Pa.
1911. Cornell, Walter S., Board of Public Education, Parkway and 21st St.
1945. Corrigan, Patrick H., 1720 S. Broad St., Trenton, N. J.
1914. Corson, Edward F., 136 S. 16th St.
1946. Costello, Thomas J., 131 Pennsylvania Avenue, Bryn Mawr, Pa.
1924. Cowan, Alfred, 1930 Chestnut St.
1940. Cowan, Thomas H., 1930 Chestnut St.
1904. Craig, Frank A., The Henry Phipps Institute, 7th and Lombard Sts.
1907. Crampton, George S., 2031 Locust St.
1947. Crane, A. Reynolds, 807 Spruce St.
1937. Crane, Martin P., 2412 N. Broad St.
1920. Creighton, William J., 37 S. 20th St.
1941. Creskoff, Adolph J., 3400 Spruce St.
1920. Cross, George H., Chester, Pa.
1917. Cross, Sumner H., P. O. Box 126, Jenkintown, Pa.

1921. Crossan, Edward T., 5324 Wayne Ave.
1940. Crowe, Aldrich C., 735 Atlantic Ave., Ocean City, N. J.
1904. Cruice, John M., 407 S. 22d St.
1937. Crump, Jean, 1930 Chestnut St.
1937. Curtis, Lawrence, 255 S. 17th St.
1934. Custer, R. Philip, 221 Walnut Ave., Wayne, Pa.
1941. *Cuttle, Tracy D., 6015 Majestic, Oakland, Cal.
1938. Dannenberg, Arthur M., 235 S. 15th St.
1947. Davis, C. Nelson, 133 South 36th St.
1936. Davis, David M., 255 S. 17th St.
1937. Davis, Perk Lee, 255 S. 17th St.
1935. Deaver, J. Montgomery, 1830 Delancey Pl.
1947. Dehne, Theodore L., Adams Avenue and Roosevelt Blvd.
1902. Dehoney, Howard, 240 S. 13th St.
1935. Deibert, Irvin Elmer, 538 Cooper St., Camden, N. J.
1948. Deichler, John W., 1930 Chestnut St.
1924. Deichler, L. Waller, 1930 Chestnut St.
1923. De Long, Perce, 37 S. 20th St.
1928. Dewees, A. Lovett, Glen Mills, Del. Co., Pa.
1924. Dillon, Edward S., 2028 Delancey Pl.
1932. Dintenfass, Henry, 1305 Spruce St.
1920. Doane, Joseph C., 617 W. Hortter St.
1948. Dohan, Francis Curtis, 80 Princeton Road, Cynwyd, Pa.
1946. Donnelly, Andrew J., 33rd and Powelton Ave.
1942. Donnelly, Edward J., 1321 Spruce St.
1933. Donnelly, Joseph C., 255 S. 17th St.
1937. Donnelly, Robert T. M., 255 S. 17th St.
1910. Drayton, William, Jr., 1930 Spruce St.
1949. Dripps, Robert D., 3400 Spruce St.
1935. Duane, William, Jr., 2100 Walnut St.
1944. Dublin, George J., 1930 Chestnut St.
1944. Dugger, John H., 3902 Vaux St.
1935. Duncan, Garfield G., 330 S. 9th St.
1937. Dunn, Charles W., 265 S. 19th St.
1942. Durant, Thomas M., 3401 N. Broad St.
1947. Durkin, John Kennan, 34 W. Montgomery Ave., Ardmore, Pa.
1942. Dyer, W. Wallace, Univ. of Pa. Hospital.
1935. Eads, John T., 2029 Delancey St.
1911. Earnshaw, Henry C., Bryn Mawr, Pa.
1936. Easby, Mary Hoskins, 1930 Chestnut St.
1948. Eaton, Francis H., 4007 Chestnut St.
1937. Edeiken, Joseph, 2130 Delancey Pl.
1944. Eger, Sherman A., 2029 Delancey St.
1949. Egoville, John W., 720 W. 63rd St.
1944. Ehrich, William E., 236 W. Hortter St.
1930. Eiman, John, Cynwyd, Pa.
1948. Einhorn, Nathan H., 6374 Drexel Road.
1946. Elfman, Louis Kenneth, 6330 Lebanon Avenue.
1911. Eliason, Eldridge L., 326 S. 19th St.
1949. Elkinton, J. Russell, Oak Lane, Moylan, Pa.
1939. Ellis, Van Mashburn, 1530 Locust St.

*On active service.

1928. Ellison, Richard T., 269 S. 19th St.
1936. Ellson, J. Vernon, Glendale Rd. & Chestnut St., Upper Darby, Pa.
1904. Elmer, Walter G., 1801 Pine St.
1937. Elsom, Kendall A., 133 S. 36th St.
1934. Ely, William C., 3912 Chestnut St.
1932. Engel, Gilson C., 255 S. 17th St.
1945. English, O. Spurgeon, 255 S. 17th St.
1942. Erb, William H., 133 S. 36th St.
1944. Estes, William L., Jr., Bethlehem, Pa.
1948. Everts, Glenn S., 5515 Wissahickon Ave., Apt. D-403.
1946. Farell, David M., 1912 Spruce St.
1922. Farley, David L., 4429 Larchwood Ave.
1903. Farr, Clifford B., Bryn Mawr, Pa.
1945. Farrar, George Elbert, Jr., 425 Tregaron Rd., Bala-Cynwyd, Pa.
1947. Farrell, Harry L., 1930 Chestnut St.
1930. Farrell, John T., Jr., 255 S. 17th St.
1935. Ferguson, Lewis Kraeer, 133 S. 36th St.
1936. Fetter, Ferdinand, 322 S. 21st St.
1945. Fetter, John S., High Rd. at Welsh Rd., Huntingdon Valley, Pa.
1935. Fetter, Theodore R., 255 S. 17th St.
1924. Fewell, Alexander G., 1924 Pine St.
1943. Finkelstein, Arthur, 645 Overhill Rd., Ardmore, Pa.
1947. First, Arthur, 1714 Spruce St.
1945. Fiske, Frederick A., 1530 Locust St.
1928. Fitz-Hugh, Thomas, Jr., 2016 Delancey Pl.
1928. Flick, John B., 330 S. 9th St.
1939. Flippin, Harrison F., 255 S. 17th St.
1946. Forster, Francis M., Jefferson Medical College.
1941. Fox, C. Calvin, 1806 Spruce St.
1906. Fraley, Frederick, 71st and City Line, Overbrook, Pa.
1941. Frazier, William Doane, 133 S. 36th St.
1942. Friedman, Reuben, 877 N. 6th St.
1933. Fritch, James Scott, 269 S. 19th St.
1937. Fritz, Herbert H., Pennswood Rd., Bryn Mawr, Pa.
1940. Fry, Kenneth E., 255 S. 17th St.
1935. Fry, Wilfred Eyles, 1930 Chestnut St.
1937. Furlong, Thomas F., Jr., Times Medical Building, Ardmore, Pa
1935. Gammon, Geo. D., Univ. of Pa. Hospital.
1931. Garner, Vaughn C., Germantown Professional Building.
1935. Geist, Donald C., 1930 Chestnut St.
1899. Gibbon, John H., Media, Pa.
1934. Gibbon, John H., Jr., 1025 Walnut St.
1939. Gibson, Glen Gregory, 2031 Locust St.
1944. Gifford, Edward S., Jr., 1913 Spruce St.
1920. Gill, A. Bruce, 1930 Chestnut St.
1927. Gilmour, William R., 413–14 Weightman Bldg., 1524 Chestnut St.
1949. Ginsburg, Isadore W., 3401 N. Broad St.
1931. Giordano, Anthony A. S., 1819 S. Broad St.
1906. Gittings, John C., 305 Hamilton Rd., Wynnewood, Pa.
1906. Goepp, R. Max, 4047 Pine St.
1945. Goldberg, Samuel J., 1723 Pine St.
1933. Goldburgh, Harold L., 1932 Spruce St.
1935. Goldsmith, N. Ralph, 136 S. 16th St.

1949. Gopadze, Illarion I., 1809 Delancey Pl.
1905. Gordon, Alfred, 1520 Spruce St.
1928. Gordon, Burgess L., 1832 Spruce St.
1937. Gordon, William, 5345 Spruce St.
1941. Gouterman, Joseph I., 1930 Chestnut St.
1947. Grady, Hugh G., Jefferson Medical College.
1894. Graham, Edwin E., 1713 Spruce St.
1926. Grant, Francis Clark, Univ. of Pa. Hospital.
1940. Greene, Lloyd B., 136 S. 16th St.
1934. Griffith, John Q., Jr., 6 N. Fredericksburg Ave., Margate, N. J.
1945. Griffiths, John E., Mermont Apartments, Bryn Mawr, Pa.
1941. Groff, Robert A., 700 Univ. of Pa. Hospital.
1933. Gruber, Charles M., 128 Overhill Rd., Cynwyd, Pa.
1932. Guequierre, Jacques P., Mermont Plaza, Bryn Mawr, Pa.
1945. György, Paul, Univ. of Pa.
1935. Hadden, Samuel B., 37 S. 20th St.
1945. Hahn, George A., 255 S. 17th St.
1935. Haines, Harlan F., 134 S. State Rd., Upper Darby, Pa.
1939. Hamblock, Leonard C., 255 So. 17th St.
1938. Hand, John G., 1724 Pine St.
1947. Hanes, William James, 218 E. Beechtree Lane, Wayne, Pa.
1932. Harris, Stanley E., 229 Maple Ave., Delanco, N. J.
1948. Harris, T. N., 2222 N. 53rd St.
1929. Harrison, Francis G., 1900 Spruce St.
1933. Harrison, William John, 135 S. 17th St.
1903. Hart, Charles D., 420 W. Mermaid Lane.
1941. Hartley, Harriet L., 1719 Rittenhouse Square.
1926. Hartmann, Fred L., 1914 Pine St.
1946. Harvey, Edith E., 405 York Rd., Jenkintown, Pa.
1947. Harvey, Rolfe Marsh, Bryn Mawr Hospital.
1935. Haskell, Benjamin F., 1426 Spruce St.
1946. Hatfield, C. Alexander, 330 S. 9th St.
1907. Hatfield, Charles James, Henry Phipps Institute, 7th and Lombard Sts.
1947. Havens, Walter Paul, Jr., 300 Cherry Lane, Wynnewood, Pa.
1947. Hawthorne, Herbert Reid, 606 North 13th St.
1911. Heed, Charles R., 1205 Spruce St.
1946. Hendrickson, Frank O., 37 S. 20th St.
1944. Herbut, Peter A., Jefferson Medical College Hospital.
1927. Herman, Leon, 136 S. 16th St.
1944. Hershey, J. Ivan, 935 Bowman Ave., Wynnewood, Pa.
1924. Hewson, William, 1614 Locust St.
1949. Heyl, W. Meredith, 100 W. Coulter St.
1924. Hirst, John C., 2d, 500 N. 20th St.
1944. Hirst, Otto C., 3601 Stokley St.
1943. Hitschler, William J., 8840 Germantown Ave.
1944. Hneleski, Ignatius S., 802 S. 48th St.
1943. Hockaday, Agnes, 316 Shadeland Ave., Drexel Hill, Pa.
1939. Hodes, Philip J., Univ. of Pa. Hospital.
1947. Hodges, John H., 1025 Walnut St.
1948. Hoffman, George L., Jr., 133 S. 36th St.
1931. Holland, H. Albert, 8200 Crittenden St.,
1949. Hollander, Joseph L., 36th & Spruce Sts.
1932. Hollingsworth, I. Pemberton, 411 N. Walnut St., West Chester, Pa.

1919. Hopkins, Arthur H., 1726 Pine St.
1949. Hopkins, Henry U., 4526 Osage Ave.
1946. Horan, Gerald W., 5819 Chester Ave.
1947. Horwitz, Orville, 237 W. Montgomery Ave., Haverford, Pa.
1944. Housel, Edmund L., 255 S. 17th St.
1928. Houser, Karl Musser, 2035 Delancey Pl.
1938. Howell, John Carnett, 326 S. 19th St.
1948. Howland, Alvin Wilcox, 255 S. 17th St.
1946. Howson, John Yeatts, 316 Lancaster Ave., Wayne, Pa.
1947. Huber, John Franklin, Temple University Hospital.
1937. Hughes, Joseph, 111 N. 49th St.
1939. Hughes, P. Boland, 419 Hillbrook Rd., Bryn Mawr, Pa.
1923. Hume, John E., 37 S. 20th St.
1946. Hunt, William T., Jr., 1930 Chestnut St.
1921. Hunter, Robert John, 2035 Delancey Pl.
1926. Husik, David N., 331 S. 46th St.
1935. Ingleby, Helen, Jewish Hospital, York & Tabor Rds.
1949. Ingraham, Norman R., Jr., Stenton and Whitemarsh Ave.
1947. Israel, S. Leon, 2116 Spruce St.
1921. Ivy, Robert H., 1930 Chestnut St.
1917. Jackson, Chevalier, 255 S. 17th St.
1932. Jackson, Chevalier L., 255 S. 17th St.
1934. Jacobs, Maurice, 1831 Delancey Place.
1947. Jaeger, Rudolph, Jefferson Hospital.
1941. Jeffers, William A., University of Pa. Hospital.
1928. John, Rutherford L., 256 S. 21 St.
1942. Johnson, Julian, 406 Conshohocken State Rd., Narberth, Pa.
1938. Johnson, Thomas A., 250 S. 18th St.
1918. Jonas, Leon, 255 S. 17th St.
1924. Jones, Harold W., 1930 Chestnut St.
1936. Kain, Thomas M., 403 Cooper St., Camden, N. J.
1948. Kaplan, Louis, 2040 Pine St.
1938. Kasper, Kelvin A., 135 S. 18th St.
1945. Katz, G. Henry, 111 N. 49th St.
1941. Kauffman, M. Luther, Medical Arts Bldg., Jenkintown, Pa.
1947. Kay, Calvin Frederick, Univ. of Pa. Hospital.
1947. Keefer, George Pfahler, 1930 Chestnut St.
1938. Keeler, Harold R., 136 S. 16th St.
1949. Keiserman, Joseph, 5460 Baltimore Ave.
1935. Kelley, George F. J., N.E. Cor. 20th and Chestnut Sts.
1932. Kelly, Herbert T., 1900 Spruce St.
1912. Kelly, Thomas C., 105 School Lane.
1941. Kennedy, Patrick J., 6910 Market St., Upper Darby, Pa.
1947. Kennedy, William Blair, 3400 Spruce St.
1948. Kern, Franklin Moore, 537 S. 46th St.
1921. Kern, Richard A., Temple University Hospital.
1935. Keyes, Baldwin L., 2031 Locust St.
1930. Kimbrough, Robert A., Jr., 807 Spruce St.
1936. King, Orville C., 330 S. 9th St.
1920. Klauder, Joseph V., 1934 Spruce St.
1920. Klein, Thomas, 250 S. 18th St.
1934. Kline, Oram R., 514 Cooper St., Camden, N. J.
1948. Klingensmith, Paul O., 133 S. 36th St.

1932. Klopp, John W., 731 E. Phil-Ellena St.
1919. Knipe, Norman L., 1930 Chestnut St.
1908. Knowles, Frank C., 423 Warick Rd., Wynnewood, Pa.
1925. Knox, Harry E., 719 66th Ave.
1945. Kobler, H. B., 658 N. 63rd St.
1948. Koerber, Kenneth A., 6101 Wayne Ave.
1914. Kolmer, John A., Cynwyd, Pa.
1936. Konzelmann, Frank Williamson, 304 Shore Rd., Absecon, N. J.
1949. Koop, C. Everett, 1740 Bainbridge St.
1941. Krall, J. Thomas, 1927 Spruce St.
1948. Kramer, David W., 2007 Pine St.
1944. Krauss, Frederick Harold, 1930 Chestnut St.
1949. Kremer, David N., 1918 Pine St.
1949. Kressler, Robert J., 330 S. 9th St.
1941. Krewson, William E., 3rd, 1930 Chestnut St.
1914. Krumbhaar, Edward B., School of Medicine, Univ. of Pa.
1947. Kuhlenbeck, Hartwig, Woman's Medical College.
1947. La Boccetta, Alfred Charles, 2nd and Luzerne Sts.
1949. La Clair, Charles H., Jr., 1021 W. Main St., Norristown, Pa.
1944. LaMotte, William O., Medical Arts Bldg., Wilmington, Del.
1946. Lampe, William T., 4207 Tyson Ave.
1933. Langdon, Roy L., 5917 Greene St.
1941. Langner, Paul H., Jr., 130 S. 18th St.
1945. Lansbury, John, 3401 N. Broad St.
1934. Laplace, Louis B., 1930 Chestnut St.
1926. Laws, George M., 1907 Spruce St.
1936. Leaman, William G., Jr., 3700 Baring St.
1920. Leavitt, Frederic Headley, 1527 Pine St.
1941. Leberman, Paul R., 136 S. 16th St.
1934. Lee, Thomas B., 622 Cooper St., Camden, N. J.
1908. Lee, Walter Estell, 1833 Pine St.
1942. Lehman, James A., 255 S. 17th St.
1936. Lehrfeld, Louis, 1321 Spruce St.
1944. Lell, William A., 203 W. Chestnut Ave.
1935. Lemmon, William T., 1930 Chestnut St.
1943. Leopold, Irving H., 1930 Chestnut St.
1920. Leopold, Simon S., 255 S. 17th St.
1944. Lettiere, Anthony J., 425 E. State St., Trenton, N. J.
1933. Levering, J. Walter, Abington Memorial Hospital, Abington, Pa.
1948. Lewey, Frederic Henry, 3400 Spruce St.
1915. Lewis, Fielding O., Providence Road, Media, Pa.
1938. Lewis, James P., 3815 Chestnut St.
1949. Lhamon, William T., Monument Road, Bala-Cynwyd, Pa.
1948. Lieber, Marshall M., 1025 Walnut St.
1948. Lieberman, Louis M., 923 Belmont Ave.
1940. Limberger, William A., 301 S. Church St., West Chester, Pa.
1938. Lindauer, M. August, 133 S. 36th St.
1927. Lindsey, Walter H., 810 W. Dauphin St.
1936. Lintgen, Charles, 1930 Chestnut St.
1945. Lisker, Samuel, 1930 Chestnut St.
1944. Livezey, Mary M., 7200 Cresheim Rd.
1936. Llewellyn, Thomas H., 910 N. 63rd St.
1907. Lodholz, Edward, 431 S. 45th St.

1931. Loewenberg, Samuel A., 1905 Spruce St.
1938. Long, Charles-Francis, 1128 70th Ave.
1933. Long, Esmond R., Henry Phipps Institute, 7th and Lombard Sts.
1949. Long, Joan Humphrey, 17B Parkway Apartments, Haddonfield, N. J.
1935. Long, William L., 2025 Walnut St.
1931. Longaker, Edwin P., 41 E. Montgomery Ave., Ardmore, Pa.
1942. Lownes, John B., 136 S. 16th St.
1936. Lucchesi, Pascal Francis, Philadelphia General Hospital.
1921. Lucké, Balduin H. E., School of Medicine, Univ. of Pa.
1932. Lukens, Francis D. W., Univ. of Pa. Hospital.
1930. Lukens, Robert M., 1308 W. Hunting Park Ave.
1929. Lull, Clifford B., Women's Bldg., Penna. Hosp., 807 Spruce St.
1939. Luongo, Romeo A., 2054 Locust St.
1947. Lurie, Max B., Henry Phipps Institute, 7th and Lombard Sts.
1919. Lynch, Frank B., Jr., Germantown Hosp., Penn and Chew Sts.
1914. Lyon, B. B. Vincent, Box 955, Winter Park, Fla.
1933. McAndrews, Leo F., Mermont Plaza, Bryn Mawr, Pa.
1932. McCahey, James F., 1534 Pine St.
1948. McCall, Milton L., 1814 Spruce St.
1900. McCarthy, Daniel J., 2025 Walnut St.
1936. McCarthy, Patrick A., Central Medical Bldg.
1935. McClenahan, William U., 5 E. Chestnut Ave.
1931. McCloskey, Edward, 7 E. Chestnut Ave.
1942. McCloskey, John F., 8720 Germantown Ave.
1935. McConnell, James W., 20th and Chestnut Sts.
1934. McCouch, Grayson P., Medical School, Univ. of Pa.
1938. McCrea, Lowrain E., 1930 Chestnut St.
1937. McCutcheon, Morton, Alden Park Manor.
1942. McDonald, P. Robb, 1930 Chestnut St.
1949. McGavic, John S., 601 Montgomery Ave., Bryn Mawr, Pa.
1945. McGee, Lemuel Clyde, Hercules Powder Company, Wilmington, Del.
1937. McGuinness, Aims C., Children's Hospital, 1740 Bainbridge St.
1940. McLaughlin, Edward F., 4116 N. Broad St.
1933. McLaughlin, James S., 330 S. 9th St.
1948. McLaughlin, John T., 1823 W. Tioga St.
1924. McMillan, Thomas M., 2044 Locust St.
1924. McPhedran, F. Maurice, Germantown Hosp., Penn and Chew Sts.
1943. Macfarlan, Douglas, 1805 Chestnut St.
1932. Macfarlane, Catharine, 136 S. 16 St.
1947. Machella, Thomas E., 232 S. 39th St.
1949. MacNeal, Perry Scott, 330 S. 9th St.
1939. Macneill, Norman N., 5807 Chew St.
1935. Maeder, LeRoy M. A., 1910 Rittenhouse Sq.
1942. Manges, Lewis C., Jr., 319 S. 16th St.
1949. Manlove, Francis R., Kenilworth Apartments.
1936. Mann, Bernard, 2019 Pine St.
1948. Marden, Philip Ayer, 1912 Spruce St.
1937. Margolies, Alexander, 255 S. 17th St.
1941. Martin, James R., 136 S. 16 St.
1935. Matthews, Robert A., 111 N. 49th St.
1939. May, Hans, 255 S. 17th St.
1934. Mecray, Paul M., 405 Cooper St., Camden, N. J.
1941. Mendell, Theodore H., 2023 Spruce St.

1949. Menkin, Valy, 3401 N. Broad St.
1943. Meranze, David R., 1031 Lakeside Ave.
1937. Meyer, George Phillip, 410 Haddon Ave., Camden, N. J.
1935. Miller, Ford A., 4016 Chestnut St.
1946. Miller, Franklin R., Jefferson Medical College.
1939. Miller, Malcolm W., 255 S. 17th St.
1939. Miller, Merle M., 6013 Greene St.
1932. Miller, M. Valentine, 114 W. Phil-Ellena St.
1921. Miller, T. Grier, 133 So. 36th St.
1937. Missett, Joseph Vincent, Jr., 2031 Locust St.
1904. Mitchell, Charles Franklin, 2003 Pine St.
1948. Mogavero, Francesco, 1930 Chestnut St.
1932. Mohler, Roy W., 1806 Spruce St.
1936. Montgomery, Hugh, 119 Glenn Road, Ardmore, Pa.
1936. Montgomery, John B., 1930 Chestnut St.
1932. Montgomery, Thaddeus L., 2031 Locust St.
1935. Moore, John Royal, Beury Bldg., Broad St. and Erie Ave.
1947. Moore, Matthew Thibaud, 1813 Delancey Pl.
1924. Moorhead, Stirling W., 1523 Pine St.
1936. Morgan, David R., Jefferson Medical College.
1893. Morris, Elliston J., 439 Midland Ave., St. Davids, Del. Co., Pa.
1944. Morris, Harold H., Villa Nova, Pa.
1945. Morris, I. Paul, 255 S. 17th St.
1949. Motley, Hurley L., 901 Remington Road, Wynnewood, Pa.
1941. Mucklé, Craig Wright, 255 S. 17th St.
1929. Mudd, Stuart, Department of Bacteriology, Medical School, Univ. of Pa.
1949. Mulholland, Stanford W., 255 S. 17th St.
1935. Mullen, Carroll Richard, 2025 Locust St.
1934. Mullen, Edward A., 6445 Greene St.
1930. Murphy, Douglas P., Univ. of Pa. Hospital.
1934. Murphy, Eugene C., 1841 S. Broad St.
1905. Mutschler, Louis H., 60 Raynhan Rd., Merion, Pa.
1945. Naide, Meyer, 2034 Spruce St.
1948. Neese, Paul H., 17 Derwen Road, Cynwyd, Pa.
1936. Nelson, Guy M., 255 S. 17th St.
1943. Nelson, Waldo E., 615 Moreno Rd., Narberth, Pa.
1905. Newcomet, William S., 3501 Baring St.
1938. Newton, Zachariah B., 601 E. Sedgwick St.
1935. Nicholson, Jesse Thompson, Pennsylvania Hospital.
1899. Nicholson, William Rufus, 1930 Chestnut St.
1941. Nisbet, Verner, 254 S. 45th St.
1947. Noone, Ernest L., 4501 Cedar Lane, Drexel Hill, Pa.
1905. Norris, Charles C., Darby and Goshen Roads, Bryn Mawr, Pa.
1938. Norris, Robert F., 513 Wynnewood Ave., Wynnewood, Pa.
1947. Oaks, Wilbur W., 606 North 13th St.
1947. O'Keefe, John J., 255 South 17th St.
1913. O'Neal, Alexander Hay, St. Davids, Pa.
1949. O'Neill, James F., 8050 Holmes Ave.
1947. Ornsteen, A. M., 2007 Delancey Pl.
1947. Ornston, Darius Gray, 36 Carpenter Lane.
1936. Orr, Theodore E., 1930 Chestnut St.
1913. Outerbridge, George W., 1927 Spruce St.
1915. Owen, Hubley R., Board of Education, 21st & Parkway.

1897. Packard, Francis R., 304 S. 19th St.
1949. Padis, Nicholas, 255 S. 17th St.
1909. Parish, Benjamin Dores, 1927 Spruce St.
1945. Park, Felix Roman, Medical Arts Bldg., Tulsa, Okla.
1940. Parker, Alan P., 330 S. 9th St.
1948. Parkhurst, Leonard Woods, 330 S. 9th St.
1944. Paschkis, Karl E., Jefferson Medical College.
1931. Paul, John Davis, 3112 N. Broad St.
1932. Payne, Franklin L., Univ. of Pa. Hospital.
1947. Pearce, Louise, Rockfeller Institute for Medical Research, Princeton, N. J.
1943. Pearson, Gerald H. J., 111 N. 49th St.
1930. Pendergrass, Eugene P., Univ. of Pa. Hospital.
1932. Pennell, Howard Y., West Chester, Pa.
1944. Pennypacker, Charles S., 111 E. Montgomery Ave., Ardmore, Pa.
1939. Pepper, D. Sergeant, 122 Grays Lane, Haverford, Pa.
1914. Pepper, O. H. Perry, Univ. of Pa. Hospital.
1916. Percival, Milton Fraser, 2332 S. Broad St.
1942. Perkins, William Harvey, 1025 Walnut St.
1946. Perloff, William Harry, 1930 Chestnut St.
1940. Pessel, Johannes F., 224 West State St., Trenton, N. J.
1937. Pettit, Horace, Times Medical Bldg., Ardmore, Pa.
1949. Pettit, Mary DeWitt, 1930 Spruce St.
1905. Pfahler, George E., 1930 Chestnut St.
1915. Pfeiffer, Damon B., Meadowbrook, Pa.
1946. Pfeiffer, Mildred C. J., 331 S. Smedley St.
1935. Phillips, Arthur W., 3904 Walnut St.
1911. Piersol, George Morris, Univ. of Pa. Hospital.
1948. Pierson, Daniel B., Jr., 1830 Delancey St.
1933. Pillsbury, Donald M., Univ. of Pa. Hospital.
1922. Pleasants, Henry, Jr., West Chester, Pa.
1937. Polk, David Stewart, Rosemont, Pa.
1932. Porter, Roland De Lance, Jenkintown, Pa.
1949. Pratt, Gerald E., 3009 Frankford Ave.
1947. Prickett, John A., Warrington, Bucks County, Pa.
1931. Pryor, Charles Allen, 255 S. 17th St.
1947. Putney, Floyd Johnson, 255 South 17th St.
1943. Radbill, Samuel X., 7043 Elmwood Ave.
1945. Rakoff, Abraham Edward, 2001 Delancey Pl.
1931. Ramsey, Frank M., 620 E. Willow Grove Ave.
1913. Randall, Alexander, 136 S. 16 Street.
1941. Rankin, Charles A., Ludlow & Heather Rd., Upper Darby, Pa.
1946. Rapoport, Milton, Children's Hospital, 1740 Bainbridge St.
1926. Ravdin, I. S., Univ. of Pa. Hospital.
1928. Reese, Warren S., 2118 Locust St.
1925. Reeves, Rufus S., 2227 Spruce St.
1920. Rehfuss, Martin E., 131 St. George's Rd., Ardmore, Pa.
1921. Reiff, E. Paul, 1927 Spruce St.
1937. Reimann, Hobert A., Jefferson Hospital.
1919. Reimann, Stanley P., 703 W. Phil-Ellena St.
1945. Rhoads, Jonathan E., Univ. of Pa. Hospital.
1936. Richards, James L., Haverford Villa, Haverford, Pa.
1919. Richardson, Russell, 320 S. 16th St.
1942. Riggs, Helena E., Philadelphia General Hospital.

1936. Ritter, Joseph A., 2405 N. 54th St.
1932. Robbins, Frederick R., 317 Millbank Rd., Bryn Mawr, Pa.
1939. Roberts, Ella, 133 S. 36th St.
1944. Roberts, Joseph E., 403 Cooper St., Camden, N. J.
1899. Roberts, Walter, 1921 Spruce St.
1932. Robertson, Harold F., 327 S. 17th St.
1903. Robertson, William Egbert, 327 S. 17th St.
1938. Roche, Philip Q., 255 S. 17th St.
1912. Rodman, John Stewart, 1726 Spruce St.
1947. Rogers, Arthur Merriam, 133 S. 36th. St.
1934. Rogers, Harry L., 1537 Pine St.
1948. Roscoe, Constantine R., 7226 Castor Ave.
1928. Rose, Edward, 426 Owen Rd., Wynnewood, Pa.
1936. Rose, Elizabeth Kirk, 426 Owen Rd., Wynnewood, Pa.
1946. Rosemond, George Parrott, Temple University, Broad & Ontario Sts.
1948. Rothman, Maurice M., 1727 Spruce St.
1932. Rothrock, Harry A., West Chester, Pa.
1936. Rothschild, Norman, 245 S. 16th St.
1937. Roxby, John B., P.O. Box * 28, Swarthmore, Pa.
1949. Royster, Henry P., 3400 Spruce St.
1941. Royster, Hubert A., Jr., The Mermont, Bryn Mawr, Pa.
1933. Rudolphy, Jay Besson, 230 S. 21st St.
1946. Rupp, Charles, 2315 Delancey Pl.
1947. Rush, Alexander, 330 South 9th St.
1945. Rynes, Samuel E., 334 S. 21st St.
1944. Sampson, David Alan, 726 Braeburn Lane, Penn Valley, Narberth, Pa.
1936. Sands, Joseph Evans, Rosemont, Pa.
1949. Saul, Leon J., 255 S. 17th St.
1908. Sautter, Albert C., Germantown Professional Bldg.
1947. Sayen, John J., 506 Montgomery Ave., Haverford, Pa.
1948. Scarano, Joseph Albert, 1432 S. Broad St.
1920. Scarlett, Hunter W., 825 Montgomery Ave., Bryn Mawr, Pa.
1917. Schaeffer, J. Parsons, Daniel Baugh Institute, 307 S. 11th St.
1929. Scheffey, Lewis C., 255 S. 17th St.
1942. Scheie, Harold G., 313 S. 17th St.
1929. Schenck, Harry P., 1235 Wyngate Rd., Wynnewood, Pa.
1945. Schlezinger, Nathan S., 255 S. 17th St.
1917. Schnabel, Truman G., 1704 Pine St.
1917. Schoff, Charles H. Media, Pa.
1928. Schofield, Frederick S., 5501 Greene St.
1921. Schumann, Edward A., 1814 Spruce St.
1948. Schwarz, Gabriel A., 255 S. 17th St.
1930. Scott, John Porter, Children's Hospital, 1740 Bainbridge St.
1940. Scott, T. F. McNair, Children's Hospital, 1740 Bainbridge St.
1924. Shallow, Thomas A., 1611 Spruce St.
1908. Shannon, Charles E. G., 1930 Chestnut St.
1928. Sharpless, Frederick C., Rosemont, Pa.
1948. Shay, Harry, 255 S. 17th St.
1931. Sheehan, William C., 8811 Germantown Ave.
1946. Shepherd, Samuel Garfield, 2039 Pine St.
1932. Sheridan, Joyce T., 412 W. Durham St.
1943. Shewbrooks, Daniel M., Penn Mutual Life Ins. Co., 6th and Walnut Sts.
1936. Shipman, James Shelby, 255 S. 17th St.

1935. Shoemaker, Robert, 3rd., 68 Byberry Rd., Hatboro, Pa.
1946. Shoup, George Daniel, 7007 N. 12th St.
1939. Shumway, Norman P., Crile Veterans Administration Hospital, Cleveland, Ohio.
1936. Shuster, Benjamin H., 1824 Pine St.
1949. Sidlick, David M., 255 S. 17th St.
1941. Silcox, Louis E., 255 S. 17th St.
1907. Sinkler, Francis W., P.O. Box 373, Bryn Mawr, Pa.
1933. Smelzer, Donald Campbell, 311 S. Juniper St.
1929. Smith, Austin T., 1830 Spruce St.
1947. Smith, Frederick C., 409 S. 22nd St.
1933. Smith, Lauren Howe, 111 N. 49th St.
1927. Smyth, Calvin Mason, Room 451, Methodist Hospital, Broad and Wolf Sts.
1938. Snodgrass, L. E., 2011 Chestnut St.
1935. Sokoloff, Martin J., 255 S. 17th St.
1940. Soloff, Louis A., 255 S. 17th St.
1935. Sommer, George N. J., 120 W. State St., Trenton, N. J.
1944. Sommer, George N. J., Jr., 120 W. State St. Trenton, N. J.
1928. Spaeth, Edmund B., 1930 Chestnut St.
1937. Spangler, John Luther, Devon, Pa.
1935. Spiegel, Ernest, 6807 Lawnton Ave., Oak Lane.
1929. Sponsler, Marshall B., 1737 Chestnut St.
1944. Stadie, William C., University Hospital.
1927. Starr, Isaac, 505 Cresheim Valley Rd.
1945. Stecher, H. Armin, 1510 Darby Rd., Havertown, Pa.
1946. Stein, Irvin, 269 South 19th St.
1947. Steiner, Charles A., Upper Darby National Bank Building, Upper Darby, Pa.
1936. Steinfield, Edward, N.E., Cor. 18th and Chestnut Sts.
1942. Stengel, Alfred, Jr., Lancaster Ave. and Cambria Court, St. Davids, Pa.
1948. Stevens, Lloyd W., 133 S. 36th St.
1941. Stewart, Winifred B., 1930 Spruce St.
1934. Stimson, Cheney M., 167 Harvey St.
1949. Stockwell, Eunice L., 2018 Pine St.
1925. Stokes, John H., 4228 Spruce St.
1928. Stokes, Joseph, Jr., Children's Hospital, 1740 Bainbridge St.
1943. Stokes, S. Emlen, 129 Chester Ave., Moorestown, N. J.
1923. Strecker, Edward A., 111 N. 49th St.
1923. Stroud, William Daniel, 1011 Clinton St.
1937. Strumia, Max M., Penn Valley, Narberth, Pa.
1933. Stuckert, Harry, 248 S. 21st St.
1937. Sturgis, Margaret C., 349 Wistar Rd., Wynnewood, Pa.
1927. Sturgis, Samuel Booth, 349 Wistar Rd., Wynnewood, Pa.
1934. Summey, Thomas J., 330 S. 9th St.
1936. Surver, James Miller, 1020 Clinton St.
1928. Swartley, William B., 6002 Greene St.
1934. Sweeney, John A., 1900 Rittenhouse Sq.
1944. Swenson, Paul C., Jefferson Hospital.
1948. Tait, Edwin Forbes, 1324 Main St., Norristown, Pa.
1943. Tassman, Isaac S., 136 S. 16th St.
1948. Tatnall, Charles R., Times Medical Building, Ardmore, Pa.
1946. Tauber, Robert, 2019 Walnut St.
1933. Taylor, Herbert W., Haverford, Pa.
1931. Taylor, Norman H., 100 W. Evergreen Ave.
1946. Thomas, Carmen C., 1930 Chestnut St.

1928. Thomas, J. Earl, Drexel Hill, Pa.
1942. Thompson, Wesley D., Jr., 18 N. Main St. Lewistown, Pa.
1927. Thorington, J. Monroe, 2031 Chestnut St.
1936. Thornton, Mary Bickings-, 2703 West Somerset St.
1936. Thorp, Francis Quicksall, 4900 Penn St.
1936. Thudium, William J., 136 S. 16th St.
1935. Tocantins, Leandro Maués, 424 W. Hortter St.
1945. Toland, Joseph J., Jr., 1241 W. Lehigh Ave.
1935. Toland, Owen J., Episcopal Hospital, Front and Lehigh Ave.
1949. Tornay, Anthony S., 37 S. 20th St.
1945. Tourish, William J., 1115 Childs Ave., Drexel Hill, Pa.
1949. Town, Arno E., 255 S. 17th St.
1936. Towson, Charles Emory, Germantown Professional Bldg.
1908. Tracy, Stephen E., Old Arch Rd., Norristown, Pa.
1947. Trueman, Robert H., 1930 Chestnut St.
1926. Tucker, Gabriel, 250 S. 18th St.
1938. Tuft, Louis, 1530 Locust St.
1933. Tumen, Henry J., 1900 Rittenhouse Sq.
1938. Turman, Christopher M., Wyncote, Pa.
1923. Turner, Creighton H., 1731 Pine St.
1945. Twyeffort, Louis H., 111 N. 49th St.
1929. Tyson, Ralph M., 255 S. 17th St.
1937. Uhle, Charles A. W., 255 S. 17th St.
1907. Ullom, Josephus T., Carpenter and Quincy Sts.
1937. Vander Veer, Joseph B., 330 S. 9th St.
1937. Van Loon, Emily Lois, 1930 Chestnut St.
1933. Vastine, Jacob H., 2nd, 136 S. 16th St.
1947. Vastine, Mary F., Woman's Medical College of Pa.
1912. Vaux, Norris Wistar, 2216 Delancey Pl.
1940. Voegelin, Adrian W., Germantown Professional Bldg.
1941. Vogel, Stoughton R., 246 Walnut Lane.
1903. Wadsworth, William S., 3914 Baltimore Ave.
1927. Wagers, Arthur J., 1429 Spruce St.
1949. Wagner, Frederick B., Jr., 251 S. 41st St.
1949. Wagner, Joseph A. 2720 Darby Rd., Havertown, Pa.
1928. Wagoner, George W., Haverford Gables, Haverford, Pa.
1938. Waldman, Joseph,, 2835-B Queen Lane.
1906. Walker, John K., 139 Little Lane, Haverford, Pa.
1907. Walker, Warren, 136 S. 16th St.
1932. Walkling, Adolph A., 136 S. 16th St.
1932. Watt, Charles C., Jr., 100 W. Coulter St.
1933. Waygood, James Jamison, 3464 School Lane.
1941. Weaver, Ruth H., 2601 Parkway.
1930. Weeder, S. Dana, 250 W. Tulpehocken St.
1920. Weidman, Fred D., 20 Tenby Rd., Havertown, Pa.
1933. Weiss, Benjamin P., The Lenox, 13th and Spruce Sts.
1923. Weiss, Edward, 269 S. 19th St.
1935. Whelan, G. L., 2100 Walnut St.
1921. Whitaker, William, 6771 Germantown Ave.
1936. White, Ellen Pawling Corson-, 1820 Pine St.
1925. Widmann, Bernard P., 250 S. 18th St.
1936. Wilder, Theodore S., 6013 Greene St.
1935. Willard, John Harrington, 334 S. 15th St.

1939. Willauer, George, 6129 Greene St.
1907. Williams, Carl, School Lane and Greene St.
1924. Williams, Horace James, 5908 Greene St.
1937. Williams, John C., 6370 Germantown Ave.
1920. Williams, Philip F., 2206 Locust St.
1927. Williamson, Ernest G., 6353 Woodbine Ave.
1949. Willson, J. Robert, 3401 N. Broad St.
1921. Wilson, George, 133 S. 36th St.
1945. Wilson, John F., 1930 Chestnut St.
1942. Wilson, Lucius R., 1305 Morris Road, Wynnewood, Pa.
1937. Wilson, Ross B., 1820 S. Rittenhouse Sq.
1902. Wilson, Samuel M., 1205 Spruce St.
1949. Wilson, William W., 133 S. 36th St.
1948. Winkelman, Nathaniel W., 1911 Spruce St.
1948. Winston, Julius, 1737 Chestnut St.
1941. Wirts, C. Wilmer, 2017 Delancey St.
1904. Wister, James W., 5430 Germantown Ave.
1933. Wohl, Michael G., 1727 Pine St.
1944. Wolf, Lewis R., 3474 Frankford Ave.
1918. Wolfertii, Charles C., S.E. Cor. 36th & Spruce Sts.
1942. Wolman, Irving J., Lakeside Apts.
1893. Wood, Alfred C., 2035 Walnut St.
1932. Wood, Francis C., 212 Laurel Lane, Haverford, Pa.
1900. Wood, George B., 329 Hathaway La., Wynnewood, Pa.
1903. Wood, Horatio C., Jr., 319 S. 41st St.
1944. Wood, H. Curtis, Jr., Skippack Pk., Whitemarsh, Pa.
1947. Wood, Oscar T., 2029 Delancey Pl.
1897. Woodward, George, W. Willow Grove Ave.
1928. Wright, Carroll S., 1402 Spruce St.
1937. Yaskin, Joseph C., 1832 Spruce St.
1943. Yawger, Nathaniel S., 103 S. 4th St., Darby, Pa.
1941. Young, Barton, Germantown Hospital.
1946. Zeigerman, Joseph H., 1836 Delancey St.
1894. Zentmayer, William, 1930 Chestnut St.
1947. Zintel, Harold A., Univ. of Pa. Hospital.
1949. Zintl, William J., 1930 Chestnut St.
1933. Zulick, J. Donald, Abington Memorial Hospital, Abington, Pa.

Non-Resident Fellows

ELECTED

1912. Addison, William H. F., 286 East Sidney Avenue, Mt. Vernon, N. Y.
1941. Aronson, Roland S., 406th Medical General, APO 500, San Francisco, Cal.
1934. Bank, Joseph, 800 N. First Ave., Phoenix, Arizona.
1949. Bixby, Edward H., 61 W. Ross St., Wilkes-Barre, Pa.
1937. Braceland, Francis, J., % Mayo Clinic, 102–11 Second Ave., S.W., Rochester, Minn.
1919. Brown, Henry P., Jr., Hueitien Hospital, Kunming, Yunnan, China.
1908. Cadbury, William W., 274 W. Main St., Moorestown, N. J.
1936. Camero, Anthony R., 657 S. Westlake Ave., Los Angeles, Cal.
1936. Clarke, Francis Mann, 116 New St., New Brunswick, N. J.
1930. Cottrell, James E., Kennedy Veteran's Administration Hospital, Memphis, Tennessee.
1947. Cutler, Norman L., 1300 Harrison St., Wilmington, Del.
1941. Dixon, Harold M., 3456 Newark St. N. W., Washington, D. C.

1897. Dorland, W. A. Newman, 1408 W. Hubbard St., Chicago, Ill.
1940. Forrester, James S., Harrisburg Polyclinic Hospital, Harrisburg, Pa.
1933. Fowler, Kenneth, 2535 Horton Ave., San Diego, Cal.
1935. Fridy, Cyrus Ward, Cyrella Farms, P.O. Box 28, Collegeville, Pa.
1947. Gaskill, Herbert S., 4528 College Ave., Indianapolis 5, Ind.
1913. Gates, Nathaniel, 10 Peterboro, Detroit, Mich.
1931. Gilman, Robert Louis, Cheyney, Pa.
1936. Guthrie, Donald, 118 S. Wilbur Ave., Sayre, Pa.
1902. Gwyn, Norman B., 109 Madison Ave., Toronto, Canada.
1936. Hatch, Lerleen Clement, 442 Molane Ave., Akron, Ohio.
1928. Hayman, Joseph Marchant, Jr., Lakeside Hosp., 2065 Adelbert Rd., Cleveland, Ohio.
1933. Hitzrot, Lewis H., Medical Director, Mercersburg Academy, Mercersburg, Pa.
1936. Hughes, Brady A., 312 Euclid Ave., Mt. Brook, Birmingham, Ala.
1899. Jopson, John H., Rutherfordton, N. C.
1947. Kelchner, Clyde H., 1125 Turner St., Allentown, Pa.
1931. Kinney, Willard H., 7300 Atlantic Ave., Ventnor, N. J.
1942. Kneedler, William H., 1821 Beverly Drive, Charlotte, N. C.
1948. Livingood, Clarence S., School of Medicine, Univ. of Texas, Galveston, Texas.
1941. Lockwood, John S., Columbia Presbyterian Medical Center, New York, N. Y.
1900. McReynolds, Robert Phillips, 213 S. Broadway, Los Angeles, Cal.
1935. Mason, James B., 4677 So. 34 St., Arlington, Va.
1932. Meade, Richard H., Jr., Blodgett Med. Bldg., Grand Rapids, Mich.
1936. Middleton, William Shainline, 2114 Adams St., Madison, Wisconsin.
1928. Moon, Virgil H., Bowman Gray School of Medicine, Winston-Salem, N. C.
1937. Nicholson, Samuel T., 2d., 642 High St., Pottstown, Pa.
1905. Norris, George W., Dimock, Pa.
1926. Paul, John Rodman, Dept. Internal Medicine, Yale University, New Haven, Conn.
1907. Price, George E., Stimson Bldg., Seattle, Wash.
1938. Read, Hilton S., 5407 Atlantic Ave., Atlantic City, N. J.
1936. Reisinger, John A., 901 20th St., N.W., Washington, D. C.
1907. Royer, B. Franklin, 429 E. Baltimore St., Greencastle, Pa.
1945. Schell, James F., Veterans Hospital, New Castle, Del.
1913. de Schweinitz, George L., 85 E. Broad St., Bethlehem, Pa.
1941. Shands, Alfred R., Jr., Alfred I. duPont Institute, Rockland Rd., Wilmington, Del.
1949. Shanno, Ralph L., 1174 Wyoming Ave., Forty Fort, Pa.
1932. Siegel, Alvin Erdreich, Medical Arts Building, Macon, Ga.
1934. Stewart, Sloan G., Pacific and North Carolina Avenues, Atlantic City, N. J.
1931. Stiles, Merritt H., 1017 Paulson Medical & Dental Bldg., Spokane, Washington.
1930. Sunderman, F. William, School of Medicine, Univ. of Texas, Galveston, Texas.
1941. Tompkins, Pendleton, 450 Sutter St., San Francisco, California.
1913. Vail, William Penn, Blairstown, N. J.
1897. Veasey, Clarence Archibald, W. 1118-9th Ave., Spokane, Washington.
1931. Walker, Herschel Carey, 320 Park Ave., New York City, N. Y.
1914. Willard, De Forrest P., Sea Island, Ga.

Honorary Fellows

Limited to Fifty, of Whom Twenty May be Foreigners

American

ELECTED

1949. Alexander, John, Univ. of Michigan Hospital, Ann Arbor, Mich.
1947. Longcope, Warfield Theobald, Johns Hopkins Hospital, Baltimore, Md.

1917. Miner, Charles Howard, B.S., M.D., Member of Board of Directors, Wilkes-Barre General Hospital; Board of Health, Wilkes-Barre; Board of Directors, White Haven Sanitarium Association and Penna. Tuberculosis Society. 264 S. Franklin St., Wilkes-Barre, Pa.

1947. Minot, George Richards, Thorndike Memorial Hospital, Boston City Hospital, Boston, Mass.

1936. Richards, Alfred Newton, PH.D., SC.D., M.D. (HON.), LL.D., Professor of Pharmacology, School of Medicine, Vice-president in charge of Medical Affairs, Univ. of Pa. School of Medicine, Univ. of Pa., Phila.

1942. Russell, Frederick Fuller, M.D., Brig. Gen. Med. Corps, U. S. A. (Ret.). Rural Route 6, Box 39, Louisville, Kentucky.

1947. Stone, Robert Spencer, Univ. of California Medical School, San Francisco, Calif.

Foreign

1937. Dale, Sir Henry Hallett, C.B.E., F.R.S., M.A., M.D., F.R.C.P., Director, National Institute for Medical Research. The Wellcome Trust, 28 Portman Sq., London, W. C. England.

1922. McCarrison, Sir Robert, K.T., C.I.E., M.D., D.SC., LL.D., F.R.C.P., Major-General, Indian Medical Service (retired). 18 Linton Rd., Oxford, England.

Honorary Associates

1942. Conklin, Professor Edwin G., Princeton University, Princeton, N. J.

1942. Donner, William Henry, Lincoln-Liberty Bldg., Philadelphia, Pa.

Necrological List

Resident Fellows	*Date of Election*	*Date of Death*
Henry P. Boyer	November 6, 1907	August 25, 1949
Charles J. Cole	October 6, 1920	June 23, 1949
John R. Davies, Jr.	December 3, 1919	April 21, 1948
John Diven	October 6, 1920	December 16, 1948
George M. Dorrance	February 6, 1907	November 21, 1949
Augustus A. Eshner	October 4, 1893	December 20, 1949
Arthur H. Gerhard	January 3, 1917	August 29, 1949
U. Grant Gifford	May 8, 1933	November 22, 1949
Sigmund S. Greenbaum	January 9, 1933	October 3, 1949
John H. Gunter	October 4, 1944	September 23, 1949
Alfred Hand	October 6, 1897	September 1, 1949
Arthur P. Hitchens	April 1, 1908	December 10, 1949
Daniel Longaker	April 5, 1893	May 30, 1949
Ralph Pemberton	February 3, 1909	June 16, 1949
Thomas S. Stewart	January 7, 1914	February 19, 1949
Non-resident Fellows		
Montgomery H. Biggs	June 3, 1903	August, 1948
Joseph S. Evans	January 4, 1905	February 8, 1948
Henry D. Jump	June 4, 1902	November 17, 1949
Hunter Holmes McGuire	October 2, 1935	January 23, 1949

Index to Volume 17

Aegerter, E. E., 98
Alexander, J. B., 69
Alpers, B. J., 47*
Anders Lectures (Stebbins), 1; (Baehr), 129
Appel, K. E., 47*
Arnett, J. H., 46*, 48*, 70, 115
Austin, J. H., 46*

Baehr, George, 129
Batson, O. V., 46*, 47*, 48*, 161, 162
Beardsley, E. J. G., 70
Beatty, J. O., 105
Bedell, A. J., 140
Bedrossian, Howard, 140
Belk, W. P., 46*
Bellet, Samuel, 69
Berk, J. E., 98
Blady, J. V., 47*, 140
Blumberg, Nathan, 69
Blumstein, G. I., 69
Boger, W. P., 105
Boles, R. S., 69
Bond, E. D., 47*[2]
Bondi, A., jr, 69, 139
Bortz, E. L., 47*
Boucot, K. R., 139
Brown, C. L., 47*, 48*, 139
Burnett, W. E., 46*
Butcher, James, 98

Campbell, E. H., 48*
Cancer of the lung (Gibbon), 49
Cannon, P. R., 98
Chambers, B. M., 70, 139
Chance, Burton, 48*
Clancy, C. F., 139
Clark, T. W., 69
Clerf, L. H., 48*, 140
Cohen, S. S., (memoir of), 21
Collections, College (annual report),161
College of Physicians of Phila.: Administrative staff, 48*; Collections (annual report on), 161; Committees, 46*; Fellows (list of), 166; Lectures (list of), 146; Library (annual report on), 154; Mütter Museum (annual report on), 161, (catalogue of), 23, 75; Officers, 46*; President (Address of), 147; Publication (annual report on), 163; Sections (annual reports on), 165, (officers), 48*, (programs), 69, 139; Treasurer (report of), 152
Colonna, P. C., 46*
Committees of the College, 46*
Cooper, D. A., 46*, 48*
Cowan, Alfred, 48*
Creskoff, A. J., 139
Cullen, M. L., 69
Cunning, D. S., 70
Custer, R. P., 46*, 98

Dannenberg, A. M., 47*
Day, Robert, 140
Deaver, J. M., 47*
DeLamater, E. D., 69
De Long, Perce, 48*
Dickey, R. F., 70
Dillon, E. S., 69[2]
Disease in Am. Rev. Army (Gibson), 121
Doane, J. C., 69
Duncan, G. G., 139[2]
Dunnington, J. H., 70
Durant, T. M., 47*[3], 69

Eiman, John, 46*
Ellson, J. V., 46*
Engel, G. C., 48*
Erskine, F. A., 69
Eshner, A. A., 21
Evans, J. S. (memoir of), 119

Fellows (list of), 166
Fetter, T. R., 47*
Fitz-Hugh, T., jr., 46*, 47*, 69, 139[2]
Flippin, H. F., 105
Follis, R. H., jr., 98
Forster, W. H., 70
Frank, J. H., 98
Frost, J. W., 69
Fry, W. E., 70

Galdston, Iago, 139
Gardner, H. T., 139
Gefter, W. I., 139
Gerhard (W. W.) memorial lecture, 98
Gibbon, J. H., 46*
Gibbon, J. H., jr., 49
Gibson, J. E., 121
Githens, J. H., 98
Grabske, C. F., 140
Grant, F. C., 47*[2]
Greear, J. N., 70
Gregory, J. E., 98
Groff, R. A., 139, 140
Group practice (Baehr), 129
Guild, S. R., 140
Guthrie, Douglas, 69
György, Paul, 98

*reference to the list of officers, committees, and administrative staff.

Hadden, S. B., 47*
Hall Mildred, 140
Harley, Robert, 140
Havens, W. P., jr, 139
Herbut, P. A., 47*
Hewson, William, 48*
Hitchens, A. P., 70
Hitschler, W. J., 70
Hodges, John, 70
Hospital insurance plan (Baehr), 129
Houser, K. M. 46*, 140
Howard, J. M., 69
Howard, J. W., 98
Hubbard, Ruth, 140
Hudson, J. M., 139

Imbriglia, J. E., 98
Israel, H. L., 69, 98

Jacobs, M. S., 47*, 48*², 139
Janton, O. H., 69
Jeffers, W. A., 47*, 48*
Johnson, Julian, 47*
Johnson, Victor, 61

Kandle, R. P., 140
Kauffman, M. L., 48*
Kay, C. F., 139
Kelly, H. T., 48*
Kennedy, P. J., 70
Kern, R. A., 46*
Keyes, B. L., 47*
Knowlton, Marjorie, 139
Krumbhaar, E. B., 46*

LaMotte, W. O., 140
Lang, O. E., 48*
Laplace, L. B., 46*, 48*, 139
Leaman, W. G., jr., 48*², 139
Lee, C. T., jr., 69
Leopold, I. M., 140
Library (annual report on), 154
Long, C.-F., 48*
Loomis, A. H., 69
Lopusniak, M. S., 98
Lorber, S. H., 69
Lucchesi, P. F., 48*
Lucké, Balduin, 46*, 98
Lukens, F. D. W., 47*²
Lung, cancer of (Gibbon), 49

McCouch, E. A., 47*
McDaniel, W. B., 2d, 48*, 154
McDonald, P. R., 70
McGavic, J. S., 70
McGuinness, A. C., 47*
Machella, T. E., 69²
Marden, P. A., 70
Marshall, D. S., II, 69
Medical education (Johnson), 61
Meek, E. C., jr., 98
Middleton, W. S., 119
Miller, T. G., 46*, 147
Miller, W. N., 139
Mitchell Oration (Rennie), 9
Montagu, M. F. A., 139²
Montgomery, T. L., 46*
Muckle, C. W., 47*
Mütter Lecture (Gibbon), 49
Mütter Museum, (annual report) 161; (catalogue of) 23, 75
Mullen, C. R., 139

Nadler, C. S., 69
Naide, Meyer, 139
Neefe, J. R., 139
Nelson, A. F., 48*
N. Y. Acad. Med., Sec. Otolaryngol., 70
Nicholson, J. T., 47*

Officers of the College, list of, 46
O'Keefe, J. J., 70
Owen, H. R., 47*², 140

Packard, F. R., 46*
Page, H. F., jr., 70
Pathological Soc. of Phila., proceedings, 98
Peacher, G. M., 140
Peckham, Robert, 140
Pendergrass, E. P., 47*
Penicillins, oral (Boger, Beatty, Flippin), 105
Pepper, O. H. P., 46*
Perkins, W. H., 46*
Phila. Public Health Soc., 140
Pirkey, W. P., 70
President's Address (Miller), 147
Psychiatry in medicine and society (Rennie), 9
Public health (Stebbins), 1
Public Health Nurses, 140
Publication committee (annual report), 163
Putney, F. J., 70

Rauchwerger, S. M., 69
Ravdin, I. S., 47*²
Reese, W. S., 46*, 48*
Reeves, R. S., 70
Rennie, T. A. C., 9
Rhoads, C. P., 69
Rhoads, J. E., 46*
Richardson, Russell, 48*
Robertson, W. E., 46*
Robinson, F. A., 69
Rodgers, L. R., 69
Rose, Edward, 48*, 139
Rutberg, F. L., 70

Schaeffer, J. P., 46*, 47*
Scheffey, L. C., 46*
Scheie, H. G., 70
Schenck, H. P., 70
Schnabel, T. G., 46*
de Schweinitz Lecture (Bedell), 140
Sections of the College, (annual reports,), 165 (officers, 48*), (programs, 69, 139)
Shands, Marian, 140
Shapiro, M. J., 70
Sheldon, W. F., 98
Shilen, Joseph, 70
Shipman, J. S., 70
Shofstall, W. H., 70
Shorey, W. K., 98
Shryock, R. H., 139
Sigel, M. M., 69
Silcox, L. E., 70
Sones, Maurice, 69, 98
Spaeth, E. B., 70, 140
Spiegelman, J., 69
Stallberg, H. W., 139
Starr, Isaac, 69
Stead, E. A., jr., 69
Stebbins, E. L., 1
Stein, S. C., 69, 98
Stokes, Joseph, jr., 70
Stroud, M. W., III, 139
Stroud, W. D., 46*, 47*, 69, 152
Strumia, M. M., 98
Sturgis, S. B., 47*
Swift, W. E., jr., 139

Teague, Russell, 140
Temkin, Owsei, 139[2]
Tocantins, L. M., 46*, 48*
Town, A. E., 139
Towson, C. E., 70
Treasurer's report, 152
Tucker, Gabriel, 48*,
Tuft, Louis, 69
Tumen, H. J., 69[2]
Tynor, G. S., 140

Vander Veer, J. B., 69

Wade, E. N., 23, 48*, 75
Wagner, J. A., 139
Waksman, S. A., 139
Waldron, J. M., 139
Walkling, A. A., 47*
Weiss, Edward, 47*
Weiss, L. B., 69
Wolferth, C. C., 46*
Wolman, I. J., 98
Wood, F. C., 46*, 139, 163
Wood, H. C., jr., 47*
World health (Arnett), 115

Yaskin, J. C., 69, 70

Zentmayer prize, 165
Zinsser, H. F., jr., 139

Vol. 17, No. 1
(4th Series)

April
1949

TRANSACTIONS & STUDIES

of the

College of Physicians

of Philadelphia

Contents

Public Health in the Changing Order (*James M. Anders Lecture XXIII*) ..... Ernest L. Stebbins 1

Psychiatry in Medicine and Society (*S. Weir Mitchell Oration XI*)
Thomas A. C. Rennie 9

Memoir
Solomon Solis-Cohen ..... Augustus A. Eshner 21

Catalogue of the Mütter Museum of the College of Physicians of Philadelphia. Parts III-XI ..... Ella N. Wade 23

Officers, Committees, Sections, and Administrative Staff of the College, 1949 46

PUBLISHED AT BALTIMORE, MARYLAND

The College of Physicians of Philadelphia does not assume responsibility for statements or views expressed by contributors to the *Transactions & Studies*. The editor checks bibliographic references, to aid in making them factually reliable, and occasionally supplies headings in the text, to facilitate reference to clearly defined portions of the text; the communications are in other respects printed exactly as they were submitted, subject to author corrections on the galleys.

An index to the annual volume of the *Transactions & Studies* appears in the fourth and final number (February) of the volume.

The scientific and historical communications are indexed in: *Biological Abstracts*; *Current List of Medical Literature; Index-catalog of the Library of the Surgeon General's Office, U. S. Army; Quarterly Cumulative Index Medicus.*

The Transactions & Studies of the College of Physicians of Philadelphia is published four times a year—April, June, December, February—at Baltimore, Maryland, by the College of Physicians of Philadelphia. Subscription, $2 a volume. Single copies, 75 cents.

Publication Office: Mt. Royal and Guilford Aves., Baltimore 2, Md. *Editorial correspondence* should be addressed to: The Editor, College of Physicians of Philadelphia, 19 South 22d Street, Philadelphia-3, Pa. Entered as second class matter June 21, 1938, at the Post Office at Baltimore, Md., under the act of August 24, 1912.

Printed in U. S. A.

INDEX NUMBER

Vol. 17, No. 4
(4th Series)

February
1950

TRANSACTIONS & STUDIES

of the

College of Physicians

of Philadelphia

Contents

The Role of Medical Group Practice in the Changing Order (*James M. Anders Lecture XXIV*) ..... George Baehr 129

Transactions of the Sections: Programs, and Abstracts from the Section on General Medicine 139

List of College Lectures, 1949 146

Annual Reports

President's Address ..... T. Grier Miller 147

Treasurer 152

Library 154

Mütter Museum and College Collections 161

Publication 163

Sections 165

List of the Fellows 166

Index to Volume 17 183

PUBLISHED AT BALTIMORE, MARYLAND

The College of Physicians of Philadelphia does not assume responsibility for statements or views expressed by contributors to the *Transactions & Studies*. The editor checks bibliographic references, to aid in making them factually reliable, and occasionally supplies headings in the text, to facilitate reference to clearly defined portions of the text; the communications are in other respects printed exactly as they were submitted, subject to author corrections on the galleys.

An index to the annual volume of the *Transactions & Studies* appears in the fourth and final number (February) of the volume

The scientific and historical communications are indexed in: *Biological Abstracts*; *Current List of Medical Literature; Index-catalog of the Library of the Surgeon General's Office, U. S. Army; Quarterly Cumulative Index Medicus.*

The Transactions & Studies of the College of Physicians of Philadelphia is published four times a year—April, June, December, February—at Baltimore, Maryland, by the College of Physicians of Philadelphia.
Subscription, $2 a volume. Single copies, 75 cents.
Publication Office: Mt. Royal and Guilford Aves., Baltimore 2, Md. *Editorial correspondence* should be addressed to: The Editor, College of Physicians of Philadelphia, 19 South 22d Street, Philadelphia-3, Pa.
Entered as second class matter June 21, 1938, at the Post Office at Baltimore, Md., under the act of August 24, 1912.
Printed in U. S. A.

The College of Physicians of Philadelphia

Founded 1787

1950

President

T. Grier Miller

Vice-president

Richard A. Kern

Secretary

Leandro M. Tocantins

Treasurer

William D. Stroud

Censors

John H. Gibbon — Edward B. Krumbhaar

Francis R. Packard — O. H. Perry Pepper

Honorary Librarian

William Egbert Robertson

Council

The forenamed; ex-presidential councillor J. Parsons Schaeffer; the chairmen of the Standing Committees; and the following

elective councillors

Thomas Fitz-Hugh, Jr. — Karl Musser Houser — Thomas M. Durant

Charles C. Wolferth — Lewis C. Scheffey — Gilson C. Engel

Librarian

W. B. McDaniel, 2d

Administrative Assistant Librarian

Elliott H. Morse

Curator of the Mütter Museum and Custodian of the College Collections

Ella N. Wade

Clerk of the College

Olga E. Lang

Superintendent

Alfred F. Nelson

Honorary Director of the Department of Medical Arts

Samuel B. Sturgis

Honorary Legal Counsel

Eric A. McCouch

Committee on Publication

David A. Cooper, *chairman*

Balduin Lucké

Francis C. Wood

Editor of the Transactions & Studies

W. B. McDaniel, 2d

Preceding Number

Vol. 17, No. 3, December, 1949

Contents

Comparison of Oral Penicillins
William P. Boger, John O. Beatty, and Harrison F. Flippin 105

Steps toward World Health and Security ..... John H. Arnett 115

Memoir
Joseph Sprague Evans ..... William S. Middleton 119

The Role of Disease in the 70,000 Casualties in the American Revolutionary Army ..... James E. Gibson 121

LIBRARY OF THE
COLLEGE OF PHYSICIANS
OF PHILADELPHIA